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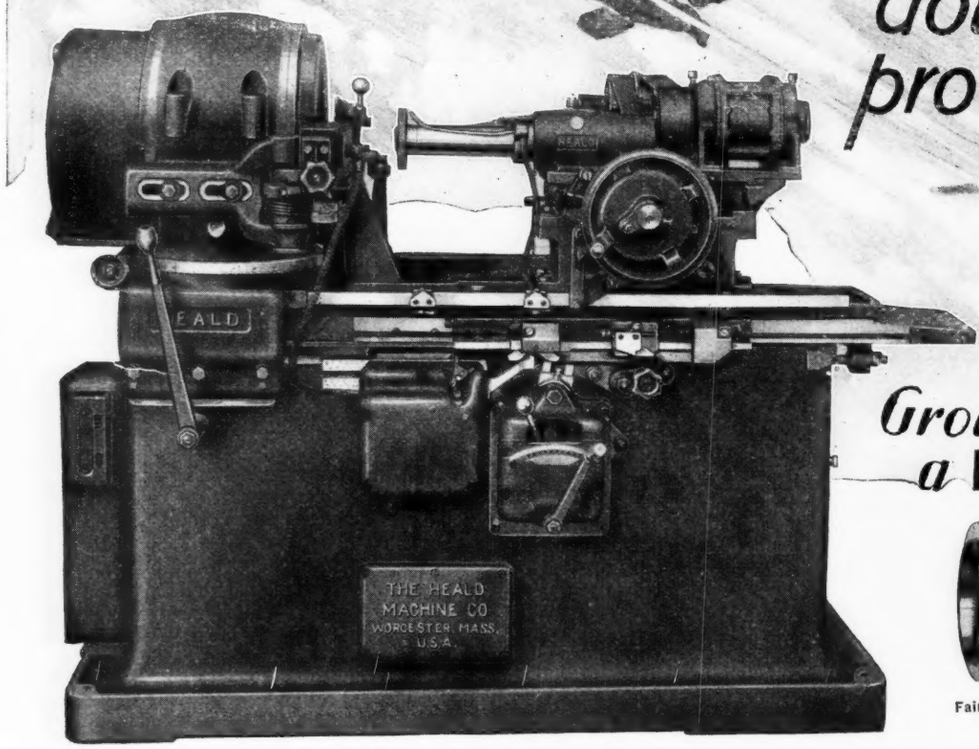

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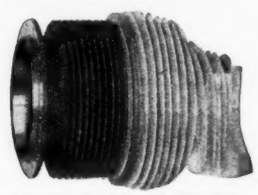

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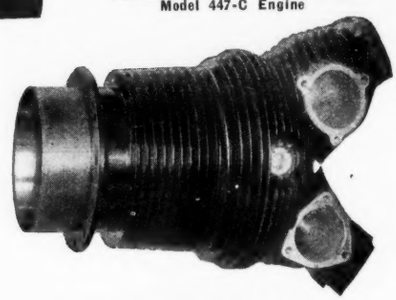

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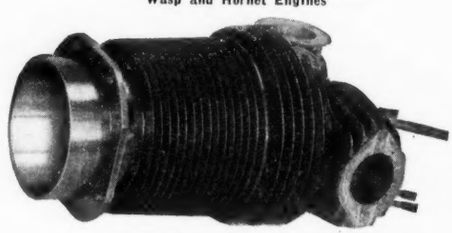

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AUTOMOTIVE INDUSTRIES
VOLUME 59 *Philadelphia, Saturday, October 6, 1928* NUMBER 14

1929 CARS—What They Show in *Mechanical* Progress

Changes of radical nature thus far absent but general increase in engine power is discernible and adoption of chromium plating has been important development.

By P. M. Heldt

AT the time of this writing definite announcements of 25 lines of passenger cars for the 1929 selling season have been made, out of a total of a little more than 40 on the American market; hence it is possible, by studying the changes made, to gain a good idea of the mechanical progress that will be represented by the 1929 products of the industry.

It seems that on the whole the rate of mechanical progress has slowed up somewhat, as compared with the previous year, which may be accounted for by the fact that latterly engineering departments have centered their attention on problems of general appearance and of interior appointments much more than in previous years.

The most outstanding development of the year is easily the general adoption of chromium plating for all outside bright parts. In fact, practically every new line announced, down to the lowest-priced, now has this non-tarnishing finish on the radiator shell, lamps and other exposed metal parts.

While it can hardly be called a new development, there has been a general increase in engine power. In many cases this has been achieved by merely increasing the compression ratio, which the general improvement in motor fuels and the wide distribution of special non-detonating fuels has rendered practical; but in other cases it has been brought about by an increase in engine speed, rendered possible by the use of larger or higher lift valves and of light alloy pistons, while increases in piston displacement also have been quite common.

Body forms and ornamentation—especially as regards the front of the body, which is always most conspicuous—have developed along rather well-defined lines. Radiators are made narrower and higher, to give the car a fleeter appearance; radiator caps are of the flush type, and a fin along the center to provide a grip, which merges into the hood hinge, has met with a considerable degree of popularity. Headlamps have been increased in size in many cases, and the positions of the various lamps have been juggled a good deal, not perhaps so much to increase the efficiency of illumination as to improve the appearance of the car as a whole.

There has been a noticeable tendency on the part of makers in general to offer the public an equipment of six wire wheels, with the spare wheels accommodated in fender wells on opposite sides of the car. Either a regular model is offered with this equipment, or it is the distinguishing feature of so-called de luxe models; or, again, the wire wheels are offered as special equipment on standard models at extra cost. Where they are sold as special equipment, a trunk rack usually is included in the outfit, to take the place of the rear spare tire carrier.

Taking up the various components of the car in turn, the general increase in engine power

THIS has been a year of early announcements of new models. With three months of 1928 still remaining, about 60 per cent of the passenger car manufacturers have already announced their lines for 1929.

From this number it is possible to obtain a fairly comprehensive picture of the mechanical features that will characterize the 1929 products, although it is understood that several producers who have been holding back their announcements will have some radical changes to disclose before the end of the year.

In analyzing the models thus far offered, Mr. Heldt finds the general adoption of chromium plating to be an outstanding development, and another point of interest is the continued trend toward greater engine power. On the whole, however, there seems to be a general slowing up in the rate of mechanical progress as compared with previous years.

has been referred to already. Increases in piston displacement were announced for both Buick models, the Chrysler 65, one Peerless and one Marmon model, the LaSalle and the Oakland. Aluminum alloy pistons have gained further adherents, particularly those with low-expansion struts. The feature of crankcase ventilation has been quite generally adopted, the usual arrangement being an oil filler hole near the front and an outlet near the rear from which a pipe leads into the air stream beneath the engine pan. In some cases provisions are made for stopping the ventilation in warm weather.

Rubber Mounting of Engines

Rubber mounting of engines also has progressed, and now is found on a majority of all models, but while some makers who already used it have endeavored to make it more effective as a vibration and noise insulator, one company has given up the practice. Like everything else, "insulation" of the engine on rubber cushions has its advantages and disadvantages. Principal among the latter is probably that it eliminates the engine crankcase as an effective cross-member of the frame. Now, frame rigidity is a very important desideratum in modern cars, especially rigidity of the front of the frame, in view of the spells of trouble from front end vibration that followed the introduction of front brakes and balloon tires. Therefore, whether or not rubber engine supports are worth while would seem to depend upon whether vibrations originating in the engine or those originating at the ground are the most troublesome.

A novel anti-vibrating device has been applied to the Plymouth, a four-cylinder car. All engines produce a rocking effect on the car frame, owing to periodic variations of their torque, which variations are the greater the smaller the number of cylinders. As the effect is a periodic one it is capable of setting up serious vibration if it happens to come into synchronism with a natural period of the chassis, and it is to prevent the building up of such vibrations that the Plymouth is fitted with a friction damper between the cylinder block and the dash.

In several makes of engine the ramps on the cams have been increased in length to insure more quiet operation.

Fuel systems have not seen much change. The type of carburetor in which fuel is mechanically injected by a pump when the throttle is suddenly opened wide, is gaining in favor. One or two additional makers have gone over to the mechanical fuel pump, while Franklin now installs a vacuum booster to prevent failure of the feed under exceptionally severe conditions. Marmon has found it expedient to heat-insulate the carburetor from the manifold to prevent vaporization of the highly volatile fractions of the fuel in the carburetor, and consequent interference with the metering.

Metric Spark Plugs

In the field of electrical equipment there has been quite a movement toward the metric spark plug. This is a smaller and more easily cooled plug, for which a need has been felt by reason of the higher compressions now carried, and the higher engine speeds used. One maker, however, is endeavoring to solve the problem of more efficient cooling by the use of a plug having a larger size hexagon, which therefore has a larger heat-dispersing area, whereas the metric plug has a smaller heat-absorbing area.

Nash has adopted two-point ignition as a means of increasing engine power. The effectiveness of this feature was demonstrated some 15 years ago when engines had comparatively large cylinders and the T-head cylinder was still popular. Shortly thereafter, however, cylinder volumes began to decline and the T-head engine to pass out of use, as a result of which the practice of firing the charge at two relatively distant points of the combustion chamber simultaneously was never widely adopted. It has been a feature, however, of such large displacement cars as the Locomobile 48, the Pierce-Arrow 36 and the Stutz.

A rather important change in car wiring methods has been introduced by Packard, which has discarded all conduits and junction boxes and uses armored cable instead of ordinary insulated cable. In connection with electric windshield cleaners of the tandem type, which keep the glass clear in front of the passenger as well as in front of the driver, a current economy feature has been introduced by including the ignition switch in the circuit of the cleaner, so that the latter stops automatically when the engine is shut down.

A commendable development is the provision of batteries of larger size. More and more cars are kept in commission all winter, and many of them are stored in cold garages. It is in starting the engine on a cold morning in winter that the battery is subjected to its most severe test. Not only will the larger batteries give greater assurance against failure to start under such conditions, but the life of the battery will be increased in much greater proportion than its capacity and cost.

Cooling Systems and Style

Cooling systems have been subjected to an indirect influence, in that one of their members, the radiator, has an important effect on the appearance of the car and therefore is subjected to style changes. In order that a radiator core with a fan behind it may be of the highest efficiency, it should be of circular form, as in that case every part would be swept by the fan. Very narrow and high cores cannot be properly covered by a single fan, and it is not impossible that if the present trend continues, we will come to the use of two radiator fans, one above the other. In one case the change in radiator styles—or the style-motivated change in proportions—has led to the discontinuance of the combined pump and fan, in order to make it possible to place the fan more advantageously.

Mention should be made here of the growing popularity of radiator shutters. Nearly all cars selling at $1,250 and over carry them this year, and indications are that their vogue will extend further down the price scale next year. All of the shutters, of course, are of the vertical type.

Engine lubricating systems remain substantially the same. In the Cadillac an extension of pressure feed has been made by carrying oil up through gun-drilled connecting rods to the piston pins, while Reo provides a dash instrument by means of which the level of oil in the crankcase can be ascertained even while the car is in motion—probably the first installation of the kind. In some of the new designs praiseworthy efforts have been made to insure continued oil-tightness of the engine.

The valves for heat control to the carburetor are working under very unfavorable conditions, and it appears that some of them have been giving trouble from corrosion due to the high temperatures to which they are exposed. To eliminate this, materials of greater heat resistance are coming to be used for them.

Clutches remain the same, the single-plate type predominating, but the use of an insert to produce a cushioning and damping effect is becoming general. In connection with transmissions, the most important development of the year is the adoption by Cadillac of a synchronizing device for the intermediate gear, which makes shifting to it, from both high and low, positive under all conditions.

At least two makers have taken an important step in connection with the location of the shift lever. Ever since the cane type of shift lever, mounted directly on the transmission cover, was introduced by Reo some 15 years ago, interference of the lever with entrance to and exit from the driver's seat has been a problem, and the situation seems to have become aggravated with the increase in length of engines and the shrinking of drivers' compartments. In recent years some rather bizarre shapes of lever have been used to bring the fulcrum and the knob where they should be, without encroaching too much on leg room. The makers referred to now mount the lever on the clutch cover plate, extending the slider bars into the clutch housing for the purpose.

Several interesting developments have taken place in connection with rear axles. The importance of making proper provision for the efficient lubrication of the gears and bearings in the center housing is becoming recognized, partly as a result of missionary effort on the part of lubricating engineers, and in one or two additional cases are deflectors provided in the housing which catch the oil that is thrown off the gear by centrifugal force and conduct it to points where lubricant is most nedeed.

Heretofore, in the case of semi-floating axles, the thrust on axle shafts due to the wheel skidding sideways, has been generally transmitted through the two shafts to the wheel bearing at the opposite end of the axle, probably because no simple bearing arrangement was available by which it could be taken up on the near bearing. Recently there has been a growing tendency to use two roller bearings, mounted back to back, at the wheel ends of the axle.

Nearly all of the recent installations of hydraulic brakes are of the internal shoe type, and several firms using mechanical brakes also have substituted the shoe type for band brakes, notably Cadillac. In many of the new designs, particularly those for the heavier cars, the self-energizing principle is being incorporated, to reduce the effort which the driver must exert in bringing the car to a stop. Much attention has been given also to means of adjustment. Introduction of four-wheel brakes made it harder to apply the brakes to the locking point. This led to the reduction of clearances in order to increase the mechanical advantage on the pedal. To maintain these close clearances it became necessary to make frequent and accurate adjustments, and in order that such adjustments will not be onerous the adjusting means must be accessibly located, easily workable, and immune from deterioration by corrosion.

Since the agitation of the subject of independent brakes, no new models have been placed on the market without separate emergency brakes, though there seems to be a tendency to make the extra brake smaller and give it more the character of a parking brake.

Central Chassis Lubrication

There have been several new installations of central-point chassis lubricating systems in the course of the year, but on the whole commercial progress in this field has not been as rapid as was anticipated about four years ago, when the systems were first put forward.

Frames are still being stiffened by using side rails of heavier section and additional cross-members, chiefly of the tubular type. This tendency to increase the strength of frames no doubt is related to the constant increase in power and speed, as well as to the tendency to increase the size of cars.

Steering gears have been a problem to automobile engineers during the past few years, partly because of the difficulty of maneuvering a heavy car with balloon tires when parked in a confined space, and partly owing to the tendency to front end vibration with the front wheels made heavier by the addition of brakes. Almost every maker has been troubled with "wheel fight" at one time or another, and different solutions of the problem have been proposed. Some of these solutions did not find favor with engineers because they tended to increase that other difficulty—hard operation of the steering gear, particularly with the car stalled. Quite recently two makers, Hupp and Packard, announced that they were providing a new cure for wheel fight by shackling the front spring on the steering gear side at both ends, cushioning the rear shackle between springs. The theory of this device seems to be that when the left front wheel strikes an obstruction, something must yield, and if the axle on that side is held rigidly in the fore and aft direction, relative to the frame, the shock is transmitted to the steering wheel, steering gears never being irreversible.

20 Per Cent of Motorists Violate Traffic Laws

AN average of one out of five motorists in the metropolitan areas is charged with violations of the traffic laws each year. This statement, issued by national headquarters of the American Automobile Association, is based on a questionnaire addressed by its safety department to police authorities of 50 cities, ranging in population from 50,000 to over 3,000,000. Complete returns were received from 18 and partial returns from others.

Following are some of the facts developed by the survey:

The number of persons charged with violations of the traffic laws in 18 metropolitan centers in 1927 was 614,232 as compared to 77,940 10 years ago.

While car registration in these cities increased only 326 per cent in the same period, there was a gain of 688 per cent in the charges of traffic violations.

Only six cities, El Paso, Tex.; Los Angeles, Cal.; Minneapolis, Minn.; Worcester, Mass.; Chicago, Ill., and Denver, Colo., showed a percentage of increase in car registrations greater than the gain in traffic violations.

Baltimore, Md., showed the greatest increase in violations of the traffic laws with a gain of 2975 per cent in the 10-year period, while car registrations increased only 374 per cent.

Los Angeles, Cal., reported the greatest increase in car registrations during the 10-year period, with 1280 per cent, while the number of traffic violations gained 997 per cent during the same time.

New Forging Method Improves Grain of Ring Gear Blanks

Dodge practice of upsetting bar stock gives uniform grain structure which makes for better machining and wearing qualities. Lessens distortion from heat treating.

By A. F. Denham

FROM time to time new methods of forging rear axle ring gear blanks have been suggested, with the object of obtaining a grain structure that would improve both the machining and wearing qualities and which at the same time would reduce scrap. One of these improved methods is now in use in the forge and foundry plant of Dodge Brothers, Inc. It consists in producing the blanks by upsetting bar stock, and the following advantages are claimed for it:

1. It provides a uniform grain structure for the entire face of the gear.

2. The grain structure is radial, rather than directed across the cut for the gear hobber, making for easier machining.

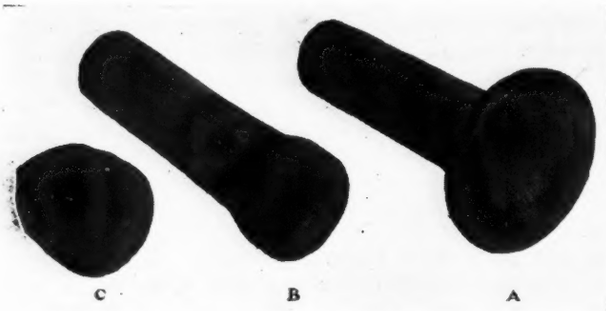


Fig. 1—Showing stages in the production of upset gear blanks: (A) shows the bar after upsetting; (B) after shearing off the "doughnut"; (C) the short piece left of the bar after repeated upsetting. (Round-corner square bar stock is now used, rather than the round-bar stock shown, on account of the lower cost)

3. Maximum density is obtained on the face of the gear, on which the teeth are cut, any porosity being confined to the rear of the blank.

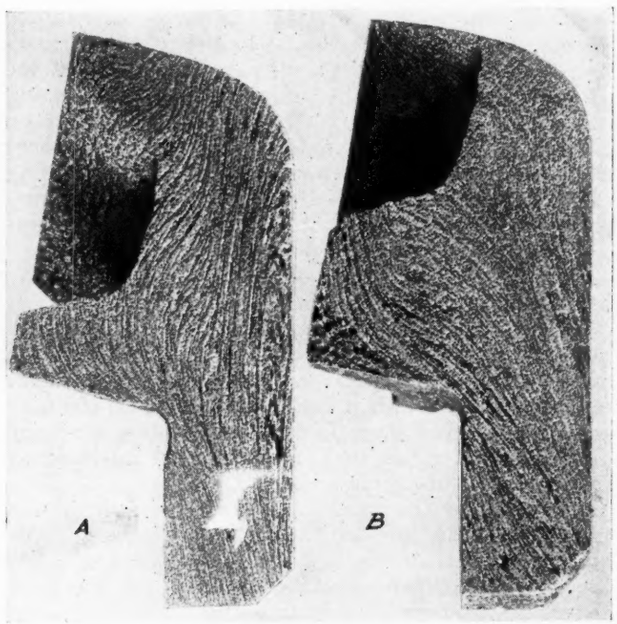


Fig. 2—This magnified photo of a polished and etched section of two ring gear teeth shows (A) correctly formed blank with the porosity confined to the back face of the gear and the grain structure following the gear tooth, and (B) an incorrectly formed blank with considerable porosity on the tooth side and the grain structure at an angle to the tooth face

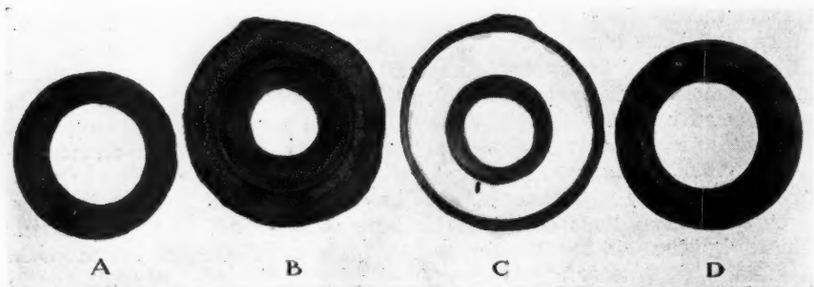


Fig. 3—(A) shows the "doughnut" sheared from the upset bar; (B) shows the same after going through the forming dies; (C) the total amount of scrap from the slagging operation; (D) the finished blank after restriking in the forming dies

4. Distortion during subsequent heat treating is considerably reduced on account of the more uniform grain structure.

5. It reduces scrap to a minimum.

6. It reduces the number of operations, the amount of steel per blank due to the reduction of scrap, and the man-power required, thereby lowering the cost.

In the process used by Dodge, 4-in., round-corner, square bar chrome vanadium steel stock is used, 12 ft.

long, with the approximate composition of 17 to 20 point carbon, 15 to 20 point vanadium and 1 per cent chromium.

About 4½ in. of bar stock is required for each ring gear blank. The bars are first heated in an oil-fired furnace, provided with water-cooled tubular supports for the bars. They are then swung from an overhead monorail swinging crane to the header. The latter, a 6 in. National, is provided with two sets of dies, one for upsetting and one for shearing. As shown in Fig. 1, the first operation "fans" the end out into a tulip shape, while the second operation shears off the outer ring in the form of a doughnut, this piece being the ring gear blank.

It will be noted from the photographic sectional views that the grain structure after heading runs radially outward rather than parallel to the axis of the bar. In Fig 2, it is seen that the densest grain structure is on the tooth side, with the porosity confined to the back of the blank which performs no operating function. Moreover, the radial grain structure makes for considerably easier machining, since the gear hobbers will be cutting with the grain rather than across it.

Scrap Reduced to Minimum

At the same time the method reduces scrap to a minimum. The entire scrap from each blank is shown in Fig. 3 (c). It amounts to about 28 oz. on the average. With this method the necessity of punching out the center has been eliminated of course. The upsetting and shearing operations on a bar are continued until it is so short that the dies will not hold it properly for upsetting. This represents four to five gear blank lengths. The remainder has been sheared with an average of about two reheats per bar.

The short ends are then stored and marked according to heat. When there is a sufficient accumulation of short ends, the dies in the header are changed to a set which enables handling of the short ends, and two or three more gears are upset and sheared off, leaving a short piece of bar stock, which is then sawed in half and made into additional gear blanks.

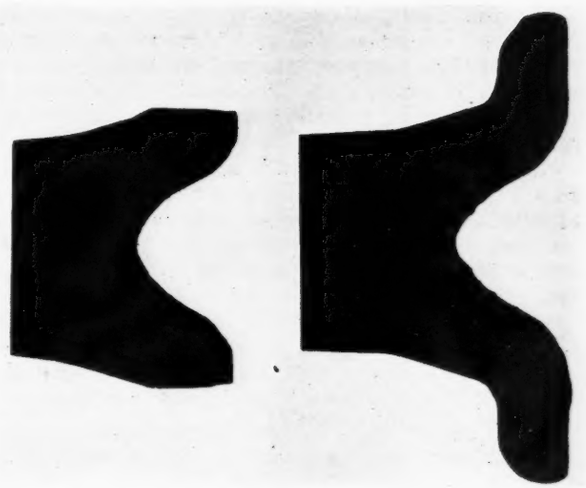


Fig. 4—A good idea of the grain flow control may be obtained from these sections of the bar stock. Note that all porosity in the steel is on one side of the upset part, which will form the back side of the blank. The pilot on the dies assists in giving correct grain flow

In order that the header may perform both shearing and upsetting, operations are carried out on two levels, the bar stock is raised and lowered by compressed air. An air trip is also provided to release the jaws. The punch die, it will be noted from the type of upset, is equipped with a pilot, which effectively reduces the die cost by increasing the life of the dies. The header is driven through a large flywheel by a 75-hp. motor, around 335 hp. being developed during the operation.

Fig. 5 (below)—This view shows the 6-in. National header used for shearing and upsetting. Note the method of handling bar stock from monorail crane lifts. The furnace for reheating is just outside the picture at the left

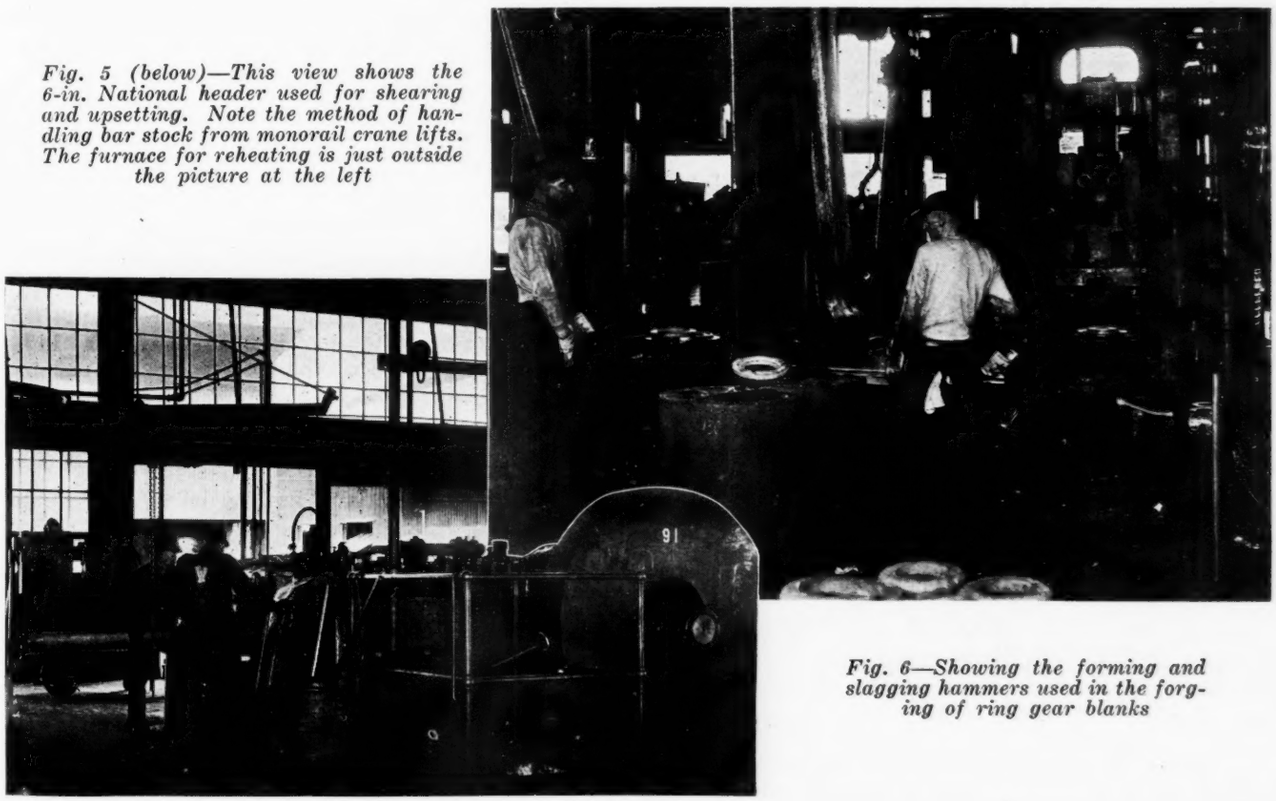


Fig. 6—Showing the forming and slagging hammers used in the forging of ring gear blanks

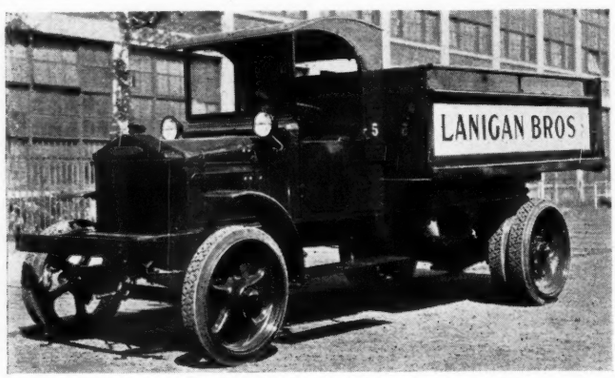
Following the upsetting and shearing operations the "doughnuts" are reheated in an oil-fired furnace, formed under a 3000-lb. hammer, trimmed hot and restruck in the original forming dies. The final form is shown in Fig. 3 (d). Before transferring the gear blanks to the machine shop they are annealed in an electric furnace, in which they are kept at 1650 deg. Fahr. for 40 min., and are then air-cooled. This furnace, which is equipped with automatic pushers, has four zones, separately controlled by L. & N. recorders, to assure maximum power economy. Pickling completes the forging operations.*

Another notable advantage of this method is said to be its effect in reducing distortion. This result seems natural, in view of the more symmetrical flow of metal in the upsetting operation, and of the more nearly uniform grain structure obtained.

*NOTE: For data regarding heat treating of the ring gear following machining see *Automotive Industries*, Aug. 4, 1928.

Pierce-Arrow 10-Ton Truck

PIERCE-ARROW'S latest contribution to commercial haulage, as mentioned in a news item in *Automotive Industries* of Sept. 22, is a 10-ton truck, known as Model RG and listed at $5,950. This new unit, powered by a 70 hp. four-cylinder dual valve, dual-ignition engine and equipped with a four-speed transmission, power braking system and worm drive rear axle, is



Pierce-Arrow Model RG 10-ton truck

offered in two wheelbase lengths, a standard length of 14 ft. and a tractor size of 12 ft. Solid tire equipment is standard.

Under the Pierce-Arrow plan of rating the new truck has a vehicle gross weight of 36,000 lb. This, with a weight of 11,500 lb. for the chassis, leaves a balance of 24,500 lb. for body and pay-load.

The 4½ by 6¾ in. engine has semi-steel cylinders cast in block, three 2½ in. main bearings, 2½ in. connecting rod bearings and 1¼ in. piston pins. Among the features are force feed lubrication to all bearings including piston pin bearings, automatically regulated Stromberg carburetor fed from a 25-gal. tank, oil purifier, battery ignition and centrifugal governor. The two ignition systems used in this engine are entirely separate and individual and comprise a battery distributor system, two coils, and a switch which will operate either one or both sets of spark plugs simultaneously. A Delco generator furnishes current for starting, lighting and ignition. The circulating system includes a fin and tube radiator and water pump.

The clutch, which is of the multiple dry-disk type, is mounted in unit with the engine. Amidships mounting is used for the transmission, location being slightly behind the driver's cab.

While the four-speed transmission, providing a reduction of 6.12 to 1 in low, is standard on this model, a multi-speed transmission having seven speeds and a "low-low" of 9.5 to 1 can be furnished. The seven-speed transmission is provided with an over-drive giving an increase in road speed of 23 per cent over direct drive. The rear axle, of the full-floating worm-drive type, is the same as used in the Pierce-Arrow Model R-F, except that the units making up the assembly are of larger dimensions. It is furnished in reductions of 10 to 1 or 11 2/3 to 1 as may be required, the former providing a governed road speed of 14.3 m.p.h. when equipped with 40 by 8 in. dual solid tires, and the latter 12.3 m.p.h. The road speed of the tractor model, which is equipped with 36 by 8 in. dual solids, is 12.8 m.p.h. or 11.1 m.p.h., according to the reduction. The transmission also provides for power take-off connection.

Service braking is on the rear wheels and propeller shaft, one pedal actuating the shoes at both points. Braking effort of the rear wheels, however, is supplemented by a vacuum type power device. The hand brake operates on the rear wheels and serves exclusively as a parking brake.

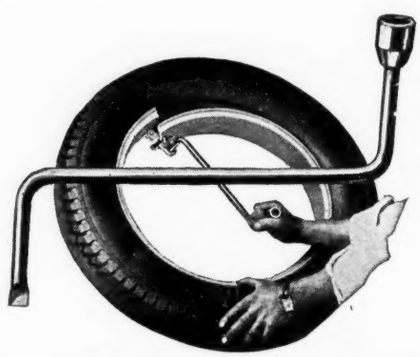
Springs are semi-elliptic and of the banded type; front, 17 leaves, 41 by 3 in.; rear, 28 leaves, 56 by 5 in. The spring shackles are supported by large diameter chrome nickel steel shafts. Drive is taken through radius rods and torque reaction through torque arms. The steering gear is of the semi-reversible screw and nut type.

While tapering front and rear to the spring supports, the midsection of the chrome-nickel steel heat-treated frame is of 10-in. section. The flange of the frame is 3 in. and the stock 5/16 in. Cross-members and brackets are built of the same proportions as the side rails. Cast steel wheels are standard, carrying 7 in. single solids in the front.

Standard equipment includes electric head and taillights, generator and battery, dash Odometer, spring type bumper, Thermostat and towing hooks.

Cleveland Rim Tool

THE Cleveland Welding Co., Cleveland, Ohio, has recently brought out a rim tool designed particularly for use with ClevWeld rims, which are standard equipment on a number of makes of cars. By the use of the tool the rim is collapsed preparatory to removing the casing without hammering, prying or the use of tire irons. The tip of the tool is inserted into the lock of the rim and a turn of the tool causes the rim to collapse.



Removing ClevWeld rim with new rim tool

Just Among Ourselves

Spurring Our Minds to Faster Gallop

WE heard a successful business paper editor the other day refer to his job as that of "helping to make minds in industry gallop just a little bit faster." The phrase appealed to us not only as a pretty good basis for a business paper editorial program, but also as an ideal almost equally adaptable for the automotive executive, whether he be concerned with sales, engineering, production or general executive control. The tendency in all supervision is likely to be weighted too heavily on the side of controlling the actions of men and of guiding them into safe and known channels, and perhaps not heavily enough on the side of stimulating their minds to a wider vision of possibilities and to a more constant and intense mental activity regarding the work at hand. After all, the rate at which an industry or a company progresses may be just about in direct relation to the speed at which the minds of men in that industry are galloping.

* * *

Over-Capacity at Its Worst

THERE are plenty of industries in this country worse off than the automotive business as regards over-capacity for production. While it is true that even in a record-breaking year like the present, our factories as a whole will have been functioning at only about 75 per cent of their total potential capacity, our problem in this respect is not severe relatively. We heard on good authority in Washington the other day of one industry making an important piece of factory equipment used in all industries, in which there are about 18 manufacturers. Of this group, it was said, there are 4, each of which by itself is capable of producing enough to fill the entire demand in any given year. That means that counting only these four firms, that industry has a 400 per cent over-production capacity, not to mention the other 14 firms which also are manufacturing and selling the same product.

* * *

An Idea Put Over by Applied Psychology

THE term "psychology" still has an impractical sound to a good many automotive executives; still we often run across some new example of a situation in some factory where a man or a few men have jumped some very practical hurdles just by application of the principles of that somewhat indefinite science. In one plant, for instance, we happened to be familiar with a rather unusual sales program that was being urged by a group of younger executives recently come into importance in the councils of the company. The entire basis of the program was strongly opposed by a few of the older executives, largely, it seemed, because they "just didn't take much stock in these new fangled notions." In this case the younger generation didn't start a fight. They merely organized a few meetings on the general subject in hand and sold the older executives on the idea of being the chief speakers. Having consented to speak, the older men got digging into the subject, gradually became interested in it, and finally began to feel themselves to be authorities on it. Only recently we were inquiring about how the program was progressing. We learned that nothing can stop it now, because the older men are daring anybody to be reactionary enough to oppose a program which they have sold themselves on; they have become apostles of the new creed. Maybe this particular instance isn't taken from an automotive plant, but it might have been. We relate it only because it seemed to us an interesting working out of applied psychology, functioning to the direct benefit of all concerned.

* * *

Helping to Create Decenter Civilization

HIRAM MOTHERWELL in *Creative Art*, says a recent article in the *New York Times*, reminds us that while the idea of beauty as a handmaiden is not in itself a new one, "what is relatively new to this age is the idea that the instinct of beauty expressed in a penny weighing scale is just as valid as when expressed in a studio canvas. In an era of machine production those artists are not the least who are devoting their ability to making commonplace things beautiful. . . . It is foolish to discuss whether or not the commercial artist is 'commercializing his talents.' He is doing literally that, and thereby helping to create a decenter civilization." By the same token, it seems to us, those automotive executives who have been and are encouraging the application of sound artistic principles in their products, in their advertising and in their whole visual contact with the public and other elements in the industry, may be said, quite definitely, also to be prominent among those "helping to create a decenter civilization."—N. G. S.

Operators Ask *Bus* Manufacturers *to* Begin Standardization

Start could be made on body design, says committee report at A.E.R.A. convention. Numerous improvements urged in construction details. Traffic is discussed.

By George T. Hook

BUS design and operating problems were accorded marked attention at the forty-seventh annual convention of the American Electric Railway Association in Cleveland last week.

While recognizing that tremendous improvement has been achieved by manufacturers in recent years in bus chassis and engine design and in the field of body design, the Committee on Bus Operation recommended that the following matters should receive further consideration from makers: (a) Bus Operator's comfort. (b) Passenger's comfort. (c) Incorporation in body design of features which would reduce the necessity for trouble calls and resulting interruption to service and loss of use of vehicle. (d) Greater attention to simplicity in body construction, permitting increased accessibility and interchangeability of parts. (e) Incorporation in the standard vehicle of many features of body design or accessories which heretofore have had to be specified as extras. (f) Desirability of beginning standardization. In regard to the latter, the committee explains its recommendation by observing that "there is no good reason why the time has not arrived to begin standardizing certain features of body design." The certain features were not enumerated.

Cooperation With Customers

Relations that exist at present between the manufacturer and the bus purchaser after the purchase were discussed in a paper presented by Charles H. Wondries, manager of the commercial division of the Studebaker Corp. of America. Explaining how bus manufacturers are striving to bring about and maintain the ideal of profitable and friendly relations with operators after they have bought equipment, Mr. Wondries enumerated the following connections which Studebaker maintains with its customers:

1. Frequent factory contact with the operator so that he will know his problems, and so that the manufacturer may cooperate with him in solving them.

2. Quick attention to service complaints. Studebaker, he said, has 60 or more men available for field service work.

3. Quick parts service and reasonable parts prices.

4. Assistance in an accounting set-up through trained accountants of Studebaker's factory systems division. Mr. Wondries observed that this is a new service.

5. Free consulting architectural service for the building of service stations, garages, bus depots, etc. The architects engaged in this work are not in competition with others, and are ready to advise, guide and discuss layouts with the operator suitable to his operation.

6. A friendly welcome to suggestions from operators by both the engineering and service departments. Many bus refinements, according to Mr. Wondries, materialize from suggestions made by operators.

7. Special service cooperation by means of a completely equipped and up-to-date service school at South Bend, available for the education of the operator's maintenance department, without charge. In this school consideration is given to labor-saving methods and equipment.

8. Publication of a service magazine which is sent to all bus operators. In this magazine are illustrated and described improved shop methods, special tools and changes and improvements in chassis design.

"Friendly, satisfied relations, to exist between purchaser and manufacturer," Mr. Wondries concluded, "must be predicated upon fairness and broad-mindedness on the part of the manufacturer. This inspires respect and confidence in the mind of the operator. It has been my pleasure to meet many large operators and I find that each one prefers to deal with the manufacturer who is sincerely interested in his operation."

The questionnaire of the Committee on Motor Vehicle Information developed a report which forecasts a prosperous future for the bus industry. The following condensed summaries of some of the answers indicate the present attitude of the reporting companies:

"The trend of bus design is toward larger buses, more luxurious coaches for interurban operation and higher-powered and better coaches for city operation.

"Independent operators seem to be buying more equipment and improving their lines, in the majority of the sections of the country.

"Opinion is divided with regard to the future of bus operation. In some sections there is a belief that there will not be a very great development in the bus field but replies from the majority of districts indicate that bus operation is expanding and will be on the increase for some time."

Disagree on Standardization

This committee, by the way, disagreed with the Committee on Bus Operation with regard to standardization, claiming that it would be a mistake to adopt rigid standardization of equipment for the reason that it would prevent beneficial experimentation and throttle initiative, and because transportation problems on various properties seem to be sufficiently different to prevent adequate standardization.

A change in the attitude of electric railways in regard to the dealings of bus manufacturers with independent operators was revealed by this report. While the majority are naturally of the opinion that the sales de-

partments of bus-making companies should cooperate with street railway companies, they do not believe that the bus makers should refuse orders from independent bus operators, but they do believe that "the bus manufacturers' sales departments should not extend too liberal credit to bus companies competing with street railway companies."

In discussing the traffic problem, E. J. McIlraith, staff engineer of the Chicago Surface Lines, who has been active during the last three years in traffic congestion relief work in Chicago, declared "the traffic problem exists because of the intensity of street use that has developed from the extravagant use of private automobiles, but since the modern standard of living seems to include for people of all classes the use of automobiles without serious consideration of cost, the railways must accept the inevitable change and make the best of it." Mr. McIlraith opined that street railways can help in traffic relief if they will put their own house in order.

Rerouting of Street Cars

"Street cars," he said, "should be so routed as to avoid intersectional interference with consequent delays. At present there are too many chance routes. Improvements can also be effected by taking turns out of important intersections. Too little of that has been done to date, the railways falsely reasoning that since the tracks are there they must be used."

Additional traffic relief assistance can be provided, in Mr. Ilraith's belief, if improvements were made in street cars so that they would possess the accelerating and decelerating characteristics of automobiles and thus keep pace with modern traffic. "Faster acceleration, high operating speeds and good brakes," was the way he expressed the needs.

Parking, dovetailing as it does with traffic questions, came in for its share of consideration. Mr. Ilraith took occasion to differ with the Committee on Traffic and Safety, which referred in its report to a parking evil. He maintains that while there is a parking problem, there is no such thing as a parking evil, and that the railway companies cannot take the attitude that they alone belong on the streets.

"Obviously," averred Fred H. Caley, secretary of the Cleveland Automobile Club, in his paper on "The Parking Problem," "the motor vehicle has risen to its present princely rank because it is a utility. The uses of the automobile are sensible, reasonable, everyday uses. And since the motor vehicle can't be moving all the time, there arises the equally sensible question of parking. It isn't a question for busybodies and half-baked, self-styled experts and civic reformers. It's a question for men of traffic experience, and preferably for those who are deeply concerned from the viewpoint of their business pocketbooks; for if this utility is made to fit profitably into the general transportation scheme, its service to all the public, including the individual automobile owner, is bound to be increased."

"Drive-it-Yourself" Liability

The liability of "drive it yourself" companies for injuries to persons operating their cars was the basis of a survey by members of the Committee on Safety. As a result of this investigation of the "drive it yourself" laws applicable in the various states, it was recommended that "all 'drive it yourself' companies and owners of automobiles be governed by law in every state similar to the New York Statute, Section 282 (e), Highway Laws, making the owner or company responsible for accidents arising out of the operation of said automobiles."

In a statement on motor vehicle accidents and compulsory insurance solicited by the safety committee, Frank A. Goodwin, ex-registrar of motor vehicles of Massachusetts, said that "any statement made by opponents of the compulsory insurance law to the effect that accidents have increased this year is a deliberate falsehood.

"Before the compulsory insurance law went into effect two-thirds of those causing injuries were financially irresponsible. As a result many persons injured said nothing about it, but now we hear from all of them. Not only them, but thousands make claim for personal injuries when they are not injured at all. The insurance people, who now point to the increase shown in personal injury statistics as an argument against the law, know these figures mean nothing. Thousands of occupants of automobiles involved in slight accidents have claimed personal injury in order to club insurance companies into paying property damage. Every insurance man knows this and many have complained to me about it. Therefore, no responsible, honest representative of an insurance company will use the personal injury statistics as a guide, for he knows that there have been less accidents this year in Massachusetts than for several preceding years."

On the subject of interstate regulation, Lewis E. Gettle, chairman of the Railroad Commission of Wisconsin, said: "Congress has thus far rejected all proposals to regulate trucks interstate, and appears reluctant to pass the bill practically agreed upon by various interests, including state commissions. Congress is no doubt reflecting the obvious popularity of truck and bus service and the widespread belief that trucks and buses are entitled not only to business which rail carriers cannot normally reach, but are also entitled to all the business they can take away from the railroads. This attitude ignores the whole question of costs and does not reflect sound economic conclusions.

Must be Fitted into Scheme

"Buses and trucks are accepted as highly convenient and necessary to the economic growth of the nation. It will be the job of regulative jurisdiction wherever finally entrusted to mold and fit this young, but a little awkward, giant into the mosaic of a scheme of properly allocated and related national transportation."

The effect of passenger automobiles on mass transportation is not as alarming as railway men have been inclined to believe, according to R. F. Kelker, Jr., consulting engineer of Chicago, who said that while automobiles have generally caused decreases in rail traffic, in the larger cities the loss due to such competition appears to be inconsequential, and that there are good reasons to believe that in all cities a considerable portion of such loss is not beyond retrieving. Mr. Kelker presented several tables compiled from reports on fairly recent traffic surveys made in various cities, which cast some light on the subject.

From these figures, in Mr. Kelker's opinion, it would appear that where mass transportation facilities are conveniently available they are used.

C. F. Kettering, president of General Motors Research Corp., in his address to the railway men made several pertinent automotive observations. The job of the automobile industry, he declared, is to keep its public dissatisfied with what it has, and if it does that it will keep on making better automobiles. Alluding to the important matter of depreciation, he said, "When we bring out a new car we don't depreciate the value of your old car. What we actually do is appreciate your mind as to what you want."

Report *is* Made *on* Endurance Test *of* Spring Steel Plates

First results of work instigated by British War Office is given in paper by G. A. Hankins, showing endurance of machined and rough plates under bending stress.

As a result of much trouble with the chassis springs on motor trucks during the war, the British War Office as long ago as 1922 requested the Department of Scientific and Industrial Research to consider generally the question of the material and design of laminated springs. A committee was appointed to look into this subject and the terms of reference were later extended so as to include also helical springs. A first report on the work of this committee, in the form of a paper on "The Endurance of Spring Steel Plates under Repetition of Reversed Bending Stress," by G. A. Hankins, has recently been published. We quote the following from a review of the paper in *Engineering*. It is to be noted in connection with this report that the ton used by the British metallurgist in expressing mechanical properties of steel is the long ton of 2240 lb.

Figs. 1 and 2 show the general arrangement of the machine. The test material consisted of spring plates about 12 in. long by 3 in. wide and ⅜ in. thick, not cambered, but heat-treated in various ways. The plate is clamped at one end; the other end carries a bearing block, in which a shaft having two out-of-balance disks, is driven by an external motor through a coiled spring drive. The bearing block carries a pointer moving in front of a fixed scale, which enables the amplitude of the forced vibrations of the spring, caused by the unbalanced weights, to be observed through a small telescope. This amplitude depends on the speed of the motor, with which the vibrations are synchronous, and on the out-of-balance weights, and by an automatic cut-out the driving motor is shut off when the amplitude exceeds a given limit. Friction is minimized by a continuous oil supply, provided by a small centrifugal pump, and kept flowing continuously through the bearings by the vibration of the spring. The driving motor runs at a maximum speed of 2500 r.p.m., and at a speed of about 2000 r.p.m. the unbalanced weight gave a calculated stress of plus and minus 33,600 lb. p. sq. in.

Nine Varieties of Steel

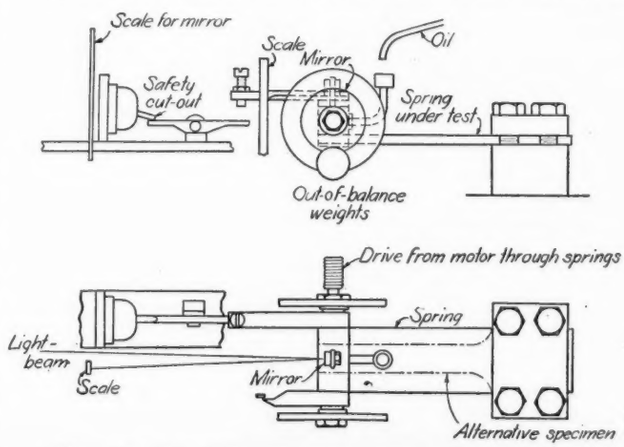
The first series of tests included nine varieties of steel, quenched at 820 deg. C. either in water or in oil, and let down from 900, 950 or 1000 deg. C. to tempering temperatures of 350, 400 or 450 deg. C., judged by the smoke, sparkle or flare of a piece of dry wood. This heat treatment was stated to have been done at the works, and from measurements of Brinell hardness and otherwise the results seem to have been somewhat variable. The general procedure consisted in plotting the square of the speed of the forced vibrations against the amplitude at that speed, according to the method developed by Gough, and taking the slight discontinuity which occurred in the resulting flattish curve to indicate the fatigue limit.

In the earlier stages of the investigation, endurance tests were then run at stresses below and above the stress corresponding to the discontinuity, and showed fair correspondence between the fatigue limit and the stress at the discontinuity of the vibrations curve. It was found that for a given speed the amplitude of the vibrations remained constant so long as the plate was uninjured. When failure occurred it usually took the form of a crack or cracks just inside the fixing jaws, and was accompanied by an increase in the amplitude of vibrations, which in some instances was very slow, and several million reversals of stress occurred before it reached the limit at which an appreciable crack was formed, and the cut-out came into operation. The average value of the fatigue limit as given by the deflection test described above lay between plus and minus 37,600 lb. p. sq. in. for a 2 per cent silicon, 0.92 per cent manganese steel (carbon content, 0.35 per cent), quenched in water, and plus and minus 30,650 lb. p. sq. in. for a 0.50 per cent carbon steel quenched in water, with a mean value of 34,300 lb. p. sq. in. for all specimens.

Resistance Can be Compared

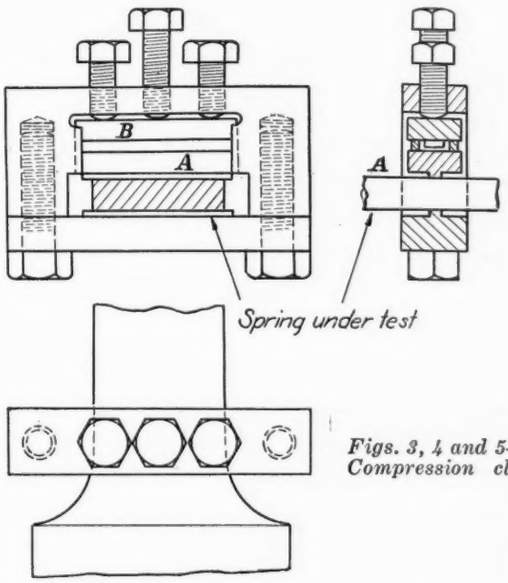
Much the same results were obtained by considering the endurance tests alone. The figures are much lower than would be obtained by the usual cantilever type of test. Their significance lies in their being made under conditions similar to those which occur in practice, so that the average results enable the resistances of the several materials under practical conditions to be compared.

A second series of tests was made on some similar specimens heat-treated in various ways in the laboratory, and confirmed the impression that the method of



Figs. 1 and 2—General arrangement of spring plate testing machine

tempering by the wood indications is not reliable as compared with the use of a suitable salt-bath or other type of furnace, with which some treatments of certain



Figs. 3, 4 and 5—Compression clip

specimens were found to give fatigue limits 20 to 30 per cent higher.

In a third series of tests it was found that the fatigue limits given by testing machined specimens in the usual cantilever machine were half as large again, or more, as that of plates tested unmachined in the special machine, though each machine applies reversed bending stresses. The assumptions made for the purposes of calculation appeared on testing to involve errors of only some 3 per cent, and it was desired therefore to ascertain the separate effects of the pressure applied in the clamping jaws and of the surface defects which are removed in the specimens prepared for the cantilever machine. Accordingly, the results obtained by the unmachined plates were compared with those of tests on specimens shaped as shown by the dotted lines in Fig. 2, but otherwise left unmachined.

In these specimens deflection tests no longer seemed to correspond with the fatigue limits ascertained by endurance trials, but the fatigue cracks occurred at the beginning of the radius 1 in. outside the jaws, and the estimated fatigue limits, though less than obtained from machined specimens of the same material in the cantilever machine, were very much higher than in the tests with the plain oblong plates. The difference between the results given by these modified specimens and those of the rotating cantilever machine was taken to be due to the effect of surface defects, and the difference between the results given by the oblong and the shaped specimens in the present machine to that of the clamps.

Clamp Applied to Plates

Seeing, however, that in the ordinary design of a laminated spring some static compressive loading normal to the plane of the plates must occur in order to hold them together, a clamp of the design shown in Figs. 3 to 5 was applied to spring plates of the shaped design at the point of maximum stress. In this clamp the spring under test is gripped between the block *A* and the inner bottom face of the holder, and static pressure is applied to it by the compression of spring washers provided between the block *A* and an upper block *B*, to an extent determined by the adjustment of the tightening screws, and calibrated in an ordinary compression testing machine for various distances between *A* and *B*. Tests with and without the clamp showed no appreciable difference in the amplitude of vibrations, but it was found that the plates failed at the clamp when compressive stresses were applied through it, and the fatigue limit was reduced by about 10 per cent for a mean compressive loading of 2 to 4 tons per sq. in. Bearing in mind that in an unmachined plate, such as is used in practice, local stresses at high points on the rough surface may be much higher than the mean, it is suggested that the mean compressive pressure should be kept low and surface irregularities avoided as far as possible.

SCIENTIFIC circles in Germany recently commemorated the fiftieth anniversary of the death of Dr. Robert Mayer for whom it is claimed that he was the first to recognize the principle of conservation of energy. He was a physician on board a Dutch ship, and while in Java he noticed that the blood in the arm veins there was usually much lighter in color than in northern latitudes, from which he concluded that the process of combustion by which the heat of the body is maintained proceeds less rapidly in the tropics, where less heat is required to maintain the body at normal temperature. During the return voyage he deduced from this observation the law of the conservation of energy, concerning which he published an article in the *Annalen der Chemie und Pharmazie* for May, 1842. In this article the principle was enunciated in the following quaint way:

1. A force is no less indestructible than a substance.
2. Ceasing motion continues as heat.

AT the annual meeting of the Berlin General Omnibus Co. one of the directors gave some interesting details of technical developments in the company's service during the past year. The fitting of governors limiting the speed of engines to 1000 r.p.m. resulted in a marked fuel economy. Separate engines and transmissions are now being preferred to unit powerplants. Experiments are being made with wheels of a light and strong magnesium alloy. New buses to be acquired by the company will be largely of the six-cylinder six-wheeled type.

STABILIZATION of currency is an economic process that is particularly hard on industries dependent upon foreign sales, and the Italian automobile industry, which is thus situated, has passed through a rather severe slump as the result of stabilization of the lira about a year ago. Whereas the automobile exports of Italy during the first five months of 1927 amounted to 368 million lire, during the same period of this year they reached only 181 million lire. The decline, however, has not been as great as these figures would indicate, for the average exchange value of the lira during the first half of the current year was materially greater than during the first half of 1927.

THE number of motor vehicles in service in Sweden is increasing rapidly. On Jan. 1 last there were registered a total of 145,363 motor vehicles and motorcycles, of which 110,135 were vehicles and 35,228 motorcycles. In 1918 Sweden had only 8000 motor vehicles. Until 1924 the number increased by about 15,000 per year, during several following years by about 18,000 and last year by 24,500.

Properties *of* Submerged *Carburetor Jets* Investigated at Purdue

Tests are made relating to effect on coefficient of discharge of liquid head, and angle and depth of chamfer. Application of results to carburetor design.

MOST modern carburetors, in contrast to those of earlier design, have the metering orifice at a point considerably lower than the level in the float chamber, instead of practically on a level with it. Presumably the discharge characteristics of such a submerged jet are not the same as those of a jet at or slightly above the level of the fuel. The characteristics of such submerged jets have been subjected to an investigation at the Engineering Experiment Station of Purdue University, Lafayette, Ind., and a full account of the investigation will be given in Bulletin No. 31 of the Experiment Station, "Discharge Characteristics of Submerged Jets," by M. J. Sucrow, which will issue from the press shortly.

Previous investigations had shown the futility of any attempt to express the discharge of a submerged jet by means of a single equation, but they indicated that dynamically similar motions can be established by plotting the discharge coefficient C as a function of the product $w\phi r$ (rate of discharge × fluidity × reciprocal of jet diameter). The objects of the investigation made at Purdue were as follows:

1. To demonstrate the proposition that the characteristic curve for a submerged jet is valid for geometrically similar jets; i.e. jets having the same length-diameter ratio.

2. To determine what effect is produced upon the characteristic curve by using different angles and depths of chamfer at the entrance to the passage.

3. To calibrate several square-edged jets, and determine what effect increasing the ratio L/D produces upon the characteristic curves for square-edged jets.

The Set-up for Tests

The set-up for the tests is illustrated in Fig. 1. The jet chamber was machined from a piece of monel metal 4 in. long and 4 in. in diameter, and has a ¾ in. central circular channel of approach to the jet. The outside diameter of the upper part is 2 in., and a ⅜ in. section of its length is threaded to fit the nut N, by which the jet is clamped in a horizontal position, with a lead gasket on each side of it, between the top of the jet chamber and the hollow cylindrical part connected to weir I. An open piezometer P_1 is connected to the jet chamber ¾ in. below the up-stream face of the jet, and the thermometer T_1 is inserted into the channel of approach approximately 2 in. from the same face.

The function of the weir I is to keep the jet submerged under a constant head. It consists of a 4 in. cylindrical chamber 6 in. high, into the bottom of which is threaded a tube of ⅞ in. inside and 1 in. outside diameter. The inner top edge of the tube which is 2 in. from the bottom of the chamber, is chamfered so that this edge is quite sharp and forms the weir crest. A piezometer P_2 connected to the chamber gives the height of the liquid therein. The petcock z_1 is kept open to the atmosphere.

The piezometer P_1 is used for measuring the static head at the up-stream side of the jet, and P_2 measures the head due to submergence. Since both of them were read on the same vertical boxwood scale O, the net static head is readily obtained by subtracting P_2 from P_1. A surveyor's transit located about 15 ft. from the apparatus was used to check the readings obtained by means of the vernier.

All measurements were made with benzol. The benzol is piped from tank A into glass bottle D on the left hand pan of the balance. To give the balance freedom of motion, the benzol is siphoned from the bottle to the

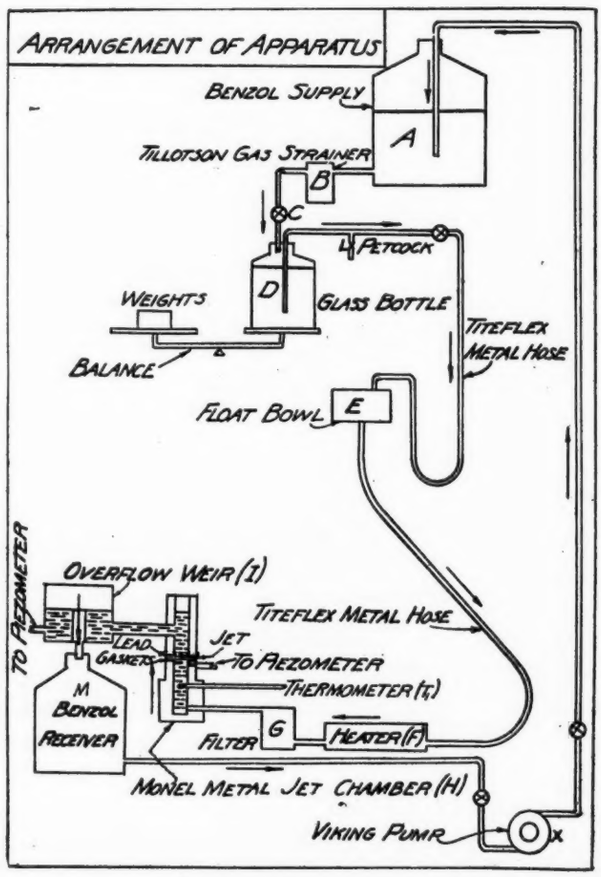


Fig. 1—Set-up for tests

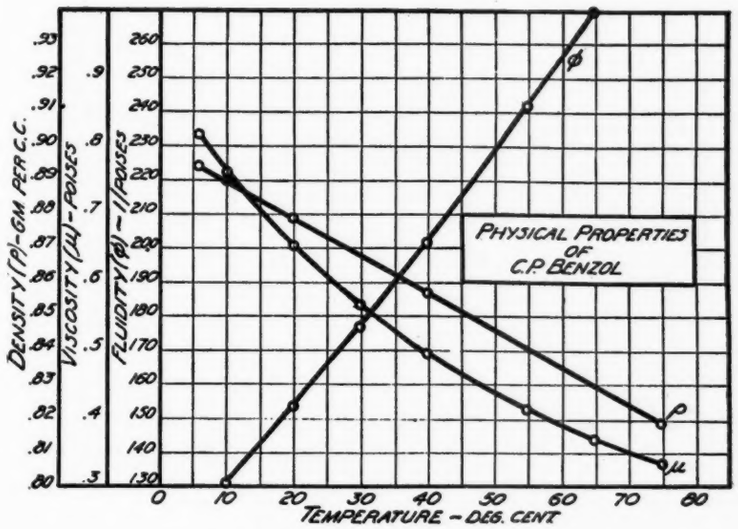


Fig. 2—Properties of benzol used in the tests

float chamber *E*. The balance is equipped with a contact wire dipping into mercury cup *U*. When a balance is reached between the scale pans the mercury cup completes an electric circuit and this operates the relay *R*, which starts and stops a stop watch.

The connections from the siphon to the float chamber and from the latter to the heater are made of Titeflex flexible metal tubing. Petcock *L* is used for priming the siphon.

The float chamber, which was from a 1½-in. standard carburetor, had the brass float and the inside of the bowl plated with chromium to reduce corrosion, and a monel metal needle valve was used to maintain a constant static head on the jet.

Referring to Fig. 1, the benzol flows from supply tank *A* through gas strainer *B*, past gate valve V_4 into glass bottle *D*. Thence the liquid is siphoned into float chamber *E*, after which it flows through a heater and filter to jet chamber *H* and up through the jet into weir *I*, which keeps the jet submerged at a constant depth of about 4 in. The liquid discharged from the weir is caught by receiver *M*, whence it is returned to supply tank *A* by means of pump *X*.

Investigation in Three Parts

The investigation naturally divided into three parts, by reason of the three distinct objects of the work. In studying the characteristics of geometrically similar jets, eight different jets with substantially the same length-diameter ratio were experimented with. The jets were machined in pairs, each pair having the same diameter. The object in making pairs of jets of the same nominal dimensions was to see if any desired jet could be reproduced accurately if desired, and also to use the data obtained with one jet as a check on the other.

The liquid used for calibrating the jets was commercially pure benzol, the physical properties of which, as determined by the Bureau of Standards, were as shown in Fig. 2. Since in all of the charts *C* (the coefficient of discharge) is plotted against the expression $w\phi r$ (rate of delivery × fluidity × 1/diameter), the effects of temperature changes are taken care of, and no attempt was made to control the temperature of the liquid during the tests. However, temperature changes during any one test were quite small.

One of the important problems of the investigation was to produce truly circular jets with square edges free from burr, with less than ½ per cent difference in the diameters at opposite ends. The method finally employed is described in the bulletin. The jet blanks had the form shown in Fig. 3. The finished jets, after being cleaned with ether and examined with the microscope, had the diameters measured with a microscope with a calibrated eyepiece scale. All unsatisfactory jets were rejected.

The method of tests is illustrated in Fig. 1. The weir is disconnected from the jet chamber and the float bowl *E* adjusted to a desired height. Valve V_1 is opened to allow the benzol to enter it, by siphon action, from bottle *D*. After sufficient benzol has flowed out of the chamber to remove most of the air entrapped between the float bowl and the chamber, the jet is clamped in place with the plane face in the upstream direction.

The air vents z_1 and z_2 are then opened to allow any remaining entrapped air (or benzol vapor) to escape. It was found that by blowing through z_2, all air-locks could be readily removed from the system.

The petcock z_2 is then closed, and valve V_4 opened so that benzol flows into the glass bottle *D* from the overhead tank *A*. The float chamber is then raised to the desired elevation and clamped to the steel guide-rod by means of a screw. When sufficient benzol has flowed into the bottle to cause the left scale pan to overbalance the right, the switch S_2 is closed. This makes it possible for an electric current to flow through the relay *R* as soon as the mercury-contact switch *U* closes. The weight of benzol exceeding that required for balancing the scales is always large enough to allow the system to reach stable conditions before the contact switch closes.

As soon as the pull on the left hand side of the balance equals that on the right, mercury switch *U* closes, thereby energizing relay *R*, which starts the stop watch and causes the warning bell, located on top of the relay box, to ring. Switch S_2 is then opened, the proper weight is removed from the weight-pan, and the switch again closed. When the amount of benzol leaving the bottle and discharging through the jet is equal to the removed weight, the mercury switch makes contact anew, thereby stopping the watch; this gives the exact time required to discharge a known weight of benzol.

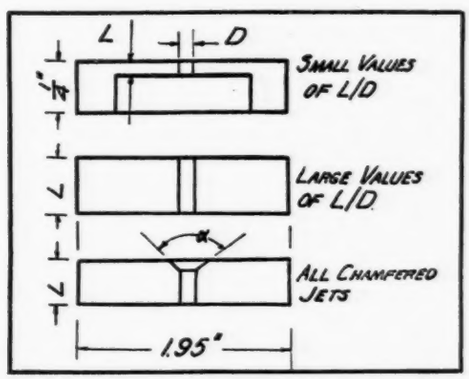


Fig. 3—Dimensions of jet disks used

During a run, readings are taken of the piezometers P_1 and P_2, and the thermometers T_1 and T_2. It was found that the float chamber *E* maintained P_1 at a constant value during each experiment; the weir *I* kept the value of P_2 constant.

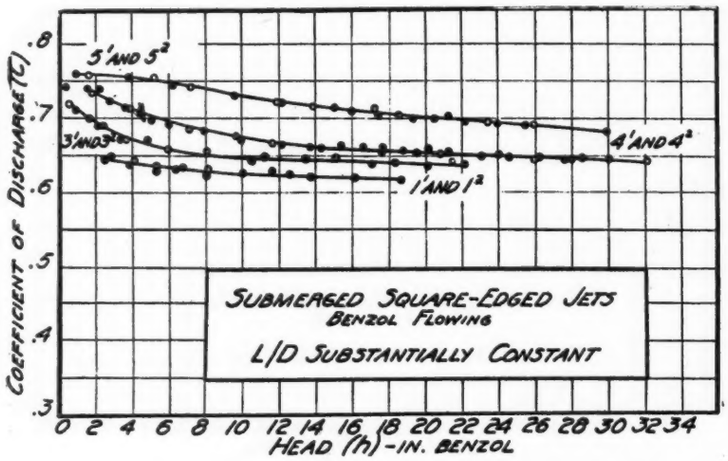


Fig. 4—Relation between head and jet and coefficient of discharge

Since the benzol is siphoned out of the glass bottle and the quantity removed is determined gravimetrically, the amount actually discharged through the jet is less than that indicated on the scales; and the diminution is proportional to the weight of the benzol displaced by the part of the pipe which is located between the initial and final benzol levels, the copper siphon tube being considered as a solid. The diameter of the tube is 0.375 in. and that of the bottle 5.73 in., so that the difference between the observed and actual quantities is one-fourth of one per cent. To compensate for this difference, an extra weight of the proper amount is removed from the right hand pan.

Various other possible sources of error, such as those in the reading of the boxwood scale used in connection with the piezometers, in the measurement of the jet diameter, evaporation losses and changes in density, were considered and are discussed at some length in the bulletin, but all were found to be unimportant.

In these tests, which were made with square-edged jets, the observed net head h was plotted as ordinate against the rate of discharge W as abscissa. The plotted results for both jets of a pair of the same dimensions fell on the same curve, thus confirming the accuracy of the data and indicating the possibility of producing duplicate jets by the method described.

In Fig. 4 the coefficient of discharge C is plotted against the net head h. Each of the four curves corresponds to a different jet diameter. When h and L/D are both constant, the coefficient of discharge decreases as the jet diameter is increased. Moreover, in the case of short jets the value of C increases as h decreases, but the range of variation of C narrows down as the jet diameter increases. Plotting the results as in Fig. 4 has the advantage that they may be readily applied in practice.

Fig. 5 shows C plotted as a function of the non-dimensional group of variables $w\phi r$. It is apparent that allowing for experimental errors, the points for all of the jets fall upon a single curve. The curve therefore applies not only to a single jet but to any one of a group of square-edged jets having the same L/D ratio.

From Fig. 5 it is seen that as $w\phi r$ is increased, C decreases, but it reaches an almost constant value when $w\phi r$ is greater than 2000. The widest variations in C occur at values of $w\phi r$ less than 1800. This signifies that as the effect of viscosity diminishes (that is, as the fluidity ϕ increases) the conditions of flow approach those of a perfect liquid and C tends to remain constant. For low values of $w\phi r$ the effect of viscosity is dominant, and the flow that probably represents a condition of motion through the jet that is quite different from that obtaining for high values of that expression. These results are in accordance with those obtained by Bond and by Finlayson, who used a single jet and varied the viscosity of the liquid discharged through it.

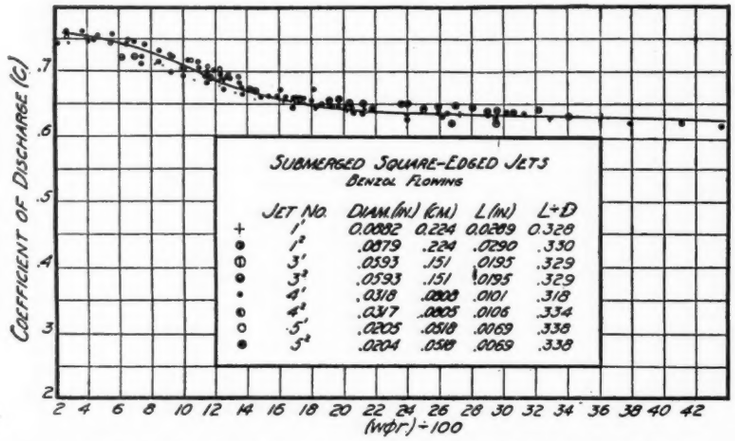


Fig. 5—Relation between the coefficient of discharge and a non-dimensional group of variables

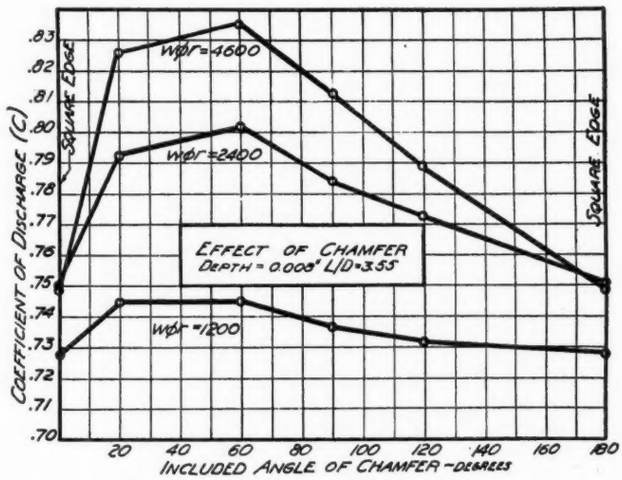


Fig. 6—Effect of angle of chamfer on coefficient of discharge

Mr. Zucrow recomputed some of the results of Tice, who used longer jets, chamfered, and from the results of Tice, Bond and Finlayson combined with his own, he draws the conclusion that the curve obtained by plotting C against $w\phi r$ is valid for all liquids flowing through a jet and for all jets geometrically similar to the one for which the results are plotted. Therefore an analysis of the flow of liquids through jets can be greatly simplified by plotting results dimensionally. All that is necessary to experiment with a single typical jet, using one liquid and an adequate range of heads, from the curve obtained, the effect of

changes in the liquid, in the rate of discharge and in the temperature can be calculated.

To secure information regarding the effects of chamfer, 10 different jets of substantially the same diameters and the same lengths were used. One of these was square-edged while the others had chamfers of different included angles. Four were chamfered to a depth of 0.008 in., the rest to a depth of 0.040 in.

Tests were first made with the jets having a chamfer 0.008 in. deep. It was found in these experiments that a small chamfer on the up-stream edge of the passage greatly increases the value of C. To determine the angle of the chamfer which consistently gives the highest values of C, the latter is plotted in Fig. 6 as a function of the chamfer angle α for three constant values of $w\phi r$. It is apparent that the maximum values of C occur when α is between 20 and 60 deg. For small values of $w\phi r$, that is, for viscous liquids or low rates of discharge, chamfering the entrance of the jet has only a small effect on the value of C, while with less viscous liquids and higher rates of flow C can be materially increased by a judicious choice of the chamfer angle.

The results obtained with deep-chamfer jets are plotted in Fig. 7. In a general way they are similar to those obtained with the small chamfers, but it was found that with the deep chamfer C is not as sensitive to small variations in α between 20 and 90 deg. when $w\phi r$ is large, but more sensitive when $w\phi r$ is small. The experiments with chamfered jets demonstrated that a shallow or deep chamfer on the up-stream edge of the passage gives higher values of C than are possible with square-edged jets having the same length/diameter ratio. By selecting a suitable value of α, a wide range of values of C can be obtained.

For this part of the investigation eight different square-edged jets were calibrated, seven of them with substantially the same diameter and one a little smaller. It was found that the L/D ratio exerts a great influence on the flow conditions within the jets. The results of this series of tests are given in Fig. 8.

In the case of a carburetor jet discharging fuel, the head causing the flow is due to static depressions which are most conveniently expressed as a head of water. The information ordinarily desired for a jet is C as a function of the head H in inches of water, or w for the jet as a function of H. From the equation

$$w = Ca\sqrt{2gh\ s}$$

Where

w = actual rate of discharge (gravimetric)
h = head in cms. of water, = 2.54H.
ρ = density of the fuel.
s = density of water.

Squaring both sides and solving for h,

$$h = \frac{w^2}{K^2C^2s\rho}$$

where $K = \sqrt{2ga}$, and is constant for a given jet.

The curves of C and of w as a function of h for a given jet are readily calculated as follows. A set of values of w are chosen, and a definite temperature. Knowing ϕ from the characteristics of the liquid, r from the dimensions of the jet, and w by assumption,

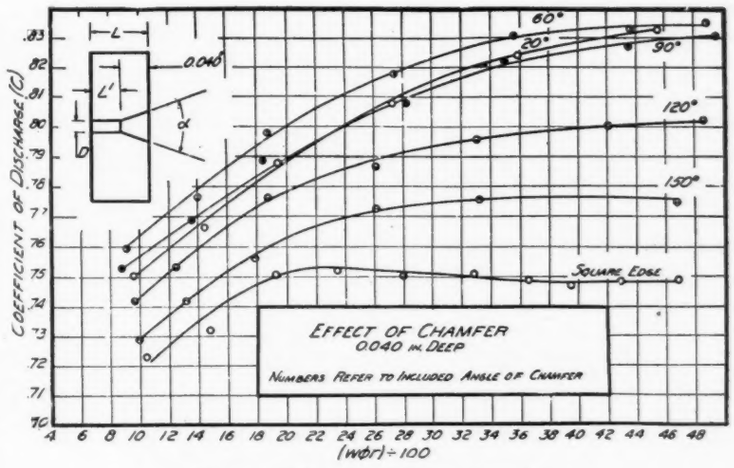


Fig. 7—Effect of deeper chamfer

we may complete a table of values for $w\phi r$. The values of C are then derived from the characteristic curves, and substituted in the equation

$$h = \frac{w^2}{XC^2}$$

where $X = \sqrt{2ga\rho s}$, and is constant at a given temperature for a given jet.

The computed values of h (or of H) can then be plotted as abscissas with the corresponding C and w as ordinates, giving the information desired. These calculations can be repeated for different conditions of temperature or for other fuels, as may be desired.

THE first automobile headlight-testing station in Illinois, which permits of accurately measuring the candlepowers of headlights at all of the points in the field of illumination for which limits are set by the headlighting regulations of the Eastern Motor Vehicle Conference, was installed recently at the Union Station Garage, 310 S. Canal Street, Chicago, by Day-Nite, Inc., of Waukesha, Wis. Heretofore only the direction of the beams and the general pattern thereof could be checked, but the Day-Nite photometer shows definitely whether or not the motorist has sufficient road light for safe driving and it also provides means of determining of objectionable glare.

The equipment consists of a white sheet-steel adjustable screen 4 x 9 ft., containing a series of photometers. The screen is supported between cast-iron posts, and is provided with a worm and gear arrangement for readily adjusting it in accordance with the heights of various headlamp mountings. The operator is thus enabled to measure the candlepower of the headlight beams required for safe road illumination. The standard lamps used in the photometer were calibrated by the Electrical Testing Laboratories of New York City.

COMPLYING with a request of the Italian Government, the Italian Automobile Manufacturers Association has decided to hold its automobile shows in the future in Rome. The first of these international automobile shows in Rome will be held in January next under the management of Count Gallenga, president of the A.C. of Rome and vice-president of the Royal Italian A.C.

Characteristics of Aluminum Alloys Reviewed at A. S. S. T. Meeting

Basic heat-treating processes and methods of casting are discussed in paper by Dr. Jeffries at opening session of Detroit Chapter. Use of beryllium limited.

A RESUME of the uses of aluminum and its alloys and their basic heat-treating processes was given at the opening session of the Detroit Chapter of the American Society for Steel Treating by Dr. Zay Jeffries, vice-president of the society and consultant to the General Electric Co. and the Aluminum Co. of America.

Metallic aluminum as produced by the Hall process, on a commercial basis, is 98 per cent pure, on the average, according to Dr. Jeffries. Purer precipitations are obtained, aluminum for conductors running around 99.6 per cent pure. Pure aluminum is also used for deoxidizing steel, and for forming the aluminum alloys.

The main alloying elements found in aluminum alloys are copper or silicon or both. Magnesium and manganese are also used, but largely for modifying the alloy characteristics. Aluminum alloys range from 25 to 125 Brinell in hardness, and from 15,000 to 75,000 lb. per sq. in. in tensile strength.

Three Methods of Casting

Three general methods of casting aluminum alloys are used as follows:

1. Permanent mold (gravity) casting which is used for such parts as pistons (10 per cent Cu. plus Fe. or Mg.; also Cu, Ni., and Mg.). Silicon-copper alloys are also used in permanent mold castings.

2. Die casting (pressure, up to 600 lb. per sq. in). Used for parts in which extreme hardness on the outside is desired, and internal porosity is not harmful. With these castings the outside is highly chilled and strong. The porosity on the inside can be controlled as to location. Silicon alloys are best adapted for intricate die castings, as this alloy is less subject to cracking. Die castings up to 7 lb. in weight have been made.

3. Sand casting. This method closely follows those of sand casting other metals, and is subject to much the same conditions.

Dr. Jeffries emphasized that a thorough grasp of the heat-treating fundamentals underlying the Al-Cu and Al-Si alloys is practically sufficient for the solution of heat-treating problems of any form of aluminum alloy, combinations of the various methods or slight modifications being the sole additional requirements.

Silicon alloys of aluminum are generally all around the eutectic point, which with a straight Al-Si alloy is 11.6 per cent Si. The addition of only 0.05 per cent Na, however, raises the eutectic point to 14•15 per cent Si. If the normal percentage of silicon (11.6) is used, the addition of the Na will increase the tensile strength and elongation materially (from 25,000 to 28,000 lb., and from 5 to 12 per cent respectively).

The effect of the addition of Na is that it enables the combination of more free aluminum, due to the specific characteristic of sodium in retarding the crystallization of silicon. The same effect as is obtained with the addition of Na can also be obtained by rapid chilling of the casting, which also prevents coarse crystallization. Without either Na or chilling, the eutectic alloys of Si will be weak and brittle, owing to this coarse crystallization.

Characteristics of the silicon alloys can be further changed by heat-treating. For instance, the plasticity can be increased by reducing the tensile strength. This is achieved by slow cooling from heat-treating temperatures, and is due to silicon particles going out of solution. Quench from heat treatment gives a harder alloy, with the Silicon remaining in solution.

While the eutectic composition of an aluminum-copper alloy is around 34 per cent Cu, this alloy is not used around the eutectic point, but is generally confined to less than 10 per cent Cu, commercially. The solid solubility of copper in aluminum is around 5.7 per cent Cu, leaving some free aluminum plus $CuAl_2$. Fracture of the copper-aluminum alloys generally follows the lines of the solid solution. Heat-treating of a 5 per cent Cu alloy for 18 to 24 hr. at 525 deg. Fahr. gives a solid solution (no eutectic), but the resultant alloy has to be quenched to prevent reprecipitation. This method of heat-treatment, which Dr. Jeffries calls the solid solution treatment, improves the physical characteristics of copper alloys of aluminum.

A secondary heat-treatment of these alloys Dr. Jeffries calls precipitation hardening, this treatment necessarily following the solid solution treatment. Carried on at fairly low temperatures it does the same thing for the copper alloys of aluminum as age-hardening does for duraluminum. The latter may be due to either the precipitation from solid solution of $CuAl_2$ or a compound of Cu, Al, and Mg.

Artificial Ageing Effect

Regarding duraluminum itself, Dr. Jeffries states that an ageing effect can be reproduced artificially by heat-treating at 100-150 deg. Fahr. Using too high a temperature, however, would result in softening the alloy again, due to the precipitation of too large particles. Duraluminum, of course, is an aluminum alloy containing manganesium silicide (Mg_2Si.), copper, and manganese, the latter's function being relatively unimportant according to Dr. Jeffries.

By ageing (precipitation heat-treatment) of the copper alloys of aluminum, nearly any combination of physical characteristics can be obtained. With a 5 per cent Cu alloy, aged at 150 deg., the maximum elongation will be obtained in about 3 hr., after which the elongation decreases fairly rapidly to 20 hr., and gradually from then on. On the other hand, the maximum tensile strength of 55,000-60,000 lb. per sq. in. is not obtained until after 40 hr. of heat-treatment.

The heat-treatment of Al-Cu-Si alloys, according to

Dr. Jeffries, is merely a combination of the treatments for the Al-Cu, and Al-Si alloys.

Aside from silicon and copper, Dr. Jeffries adds magnesium silicide as a useful alloying compound. A Brinell hardness of 120, and a tensile strength of 52,000 to 53,000 lb. per sq. in., can be obtained with an alloy containing 1 per cent Si and 0.6 per cent Mg.

Dr. Jeffries also discussed the use of deposits of pure aluminum as protective coatings for aluminum alloy to prevent corrosion, stating that their remarkable protective qualities for uncoated surfaces are due to the electro-chemical difference in potential between aluminum and its alloys.

Of the forgeable alloys, Dr. Jeffries mentioned two, designated commercially as 25S and 51S. The former is similar in composition to duraluminum except that it contains no magnesium, and therefore requires artificial ageing. It is largely used for airplane propellers.

Dr. Jeffries said that the 51S is even better for forging. It contains no copper. It is used at present for such large and complicated parts as crankcases for radial engines (Pratt and Whitney "Wasp" and "Hornet").

A point emphasized was the relatively greater importance and the greater opportunities for use of the stronger aluminum alloys as compared with alloy steels. This is due to the insignificant change in cost of such alloys with aluminum, since the latter is generally more costly than the metals used to alloy with it.

In the discussion, Dr. Jeffries was asked whether heat-treated aluminum alloy pistons were subject to change in operation. He stated that the skirt will not change, but that the physical characteristics of the head are probably affected because the head reaches a higher temperature in service than it is subjected to during heat-treatment. This applies also to the top ring land.

As regards the use of beryllium as an alloying element, Dr. Jeffries stated that they had experimented only with alloys containing very low percentages of this metal, since considerations of cost would render any large proportion of beryllium out of the question commercially. No outstanding characteristics were imparted to aluminum by small additions of this metal, Dr. Jeffries stated.

Regarding casting temperatures for both copper and silicon alloys of aluminum, Dr. Jeffries stated that the lowest practical temperature was the best. Modified alloys of these metals, however, often are not as sensitive to variations and can be cast without appreciable change at temperatures up to 1400 deg. Fahr.

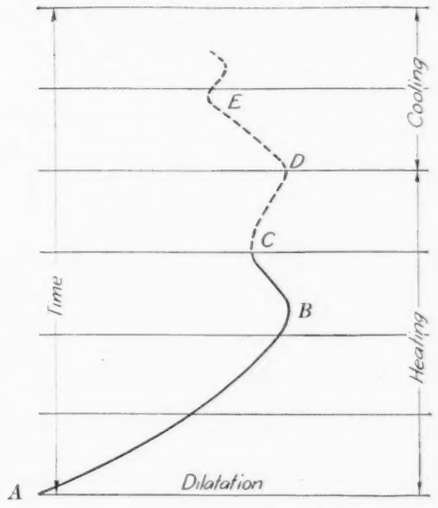
Asked to compare an 8 per cent copper with a 10 per cent silicon, 2 per cent copper alloy, Dr. Jeffries said there was not much difference between them in respect to physical properties, but that the 8 per cent Cu alloy machined easier.

Time Factor in Heat Treating

STANLEY P. ROCKWELL, the well-known metallurgist, states that in heat treatment where control of distortion is essential, time is just as important a factor as temperature.

In fuel-fired furnaces the rate of heating can be controlled by the fuel valves, and in electric furnaces by means of rheostats. A Rockwell dilatometer attached to the furnace in such a case will indicate the rate of heating and also serve as a guide to the proper time for quenching.

In the case under consideration, the dilatometer would trace a curve similar to that shown herewith. Point *A* denotes the beginning of heating, and the gears expand to point *B*, which is the Ac_1 point of the steel. At this point the signal light on the alarm panel lights up. This part of the curve (*A-B*), by its inclination and curvature, reveals the conditions of heating. If the line is nearly horizontal, heat is being supplied faster than



Dilatometer curve

it can be taken up by the charge, and distortion occurs. If, on the contrary, the curve is nearly vertical, the heating is unnecessarily slow, and time is wasted.

After reaching point *B* the gears contract to point *C*, which is the true Ac_3 point, and at this point the bell rings on the dilatometer panel. This is the best point for quenching, as the gears now have the least volume at which proper results from heat treatment can be obtained.

If the gears are not quenched at this point but left in the furnace, they will expand again, as shown by the dotted line, to *D*. The furnace must necessarily always be at a higher temperature than the work, since otherwise it would not be possible to transfer heat to the work.

Eventually the charge becomes soaked at the furnace temperature, but since the volume of the steel increases rapidly from the Ac_3 point on, if the steel is quenched after it has attained the furnace temperature, at point *D*, there is much greater distortion than if it had been quenched at point *C*.

Tests with the Rockwell dilatometer are said to have definitely proved that the distortion of steel on quenching is proportional to the volume of the steel at the time of quenching as compared with its volume after quenching. Remarkable differences in warpage result from the volume increase during a very short time after the Ac_3 point has been passed.

In order to cure very obstinate cases of distortion the steel may be quenched when at a still smaller volume than at *C* in the figure. In that case the steel, after it has been heated through the decalescence range at *C*, is allowed to cool to a point sufficiently above the recalescence point at *E* so that quenching will still develop the required hardness. As may be seen from the extension of the dotted line, at this point the steel is of still smaller volume than at *C*, and the distortion is proportionately less.

Thinks Radical *Changes* May be Due *in* Machine Tool Design

Development of new steels of greater cutting ability likely to mean revolutionary improvements in construction of machines, E. F. DuBrul tells A.S.M.E. production men.

By K. W. Stillman

A POSSIBLE change in machine tool design as revolutionary as that which followed the introduction of high speed cutting tools was predicted by E. F. DuBrul, general manager of the National Machine Tool Builders Association, at the National Machine Shop Practice Meeting held at Cincinnati last week. Recent developments in alloy cutting steels both here and abroad, Mr. DuBrul said, are likely to make changes in machine tool design necessary to give them sufficient power and rigidity to obtain all the production economies made possible by the ability of the new steels to cut metal.

As a sample of what may be expected, he cited the case of a German lathe manufacturer who has developed a new lathe for the express purpose of taking advantage of the cutting ability of a new German cutting steel. With this machine and a tool of the new type a heavy cut can be taken in steel forgings at the rate of 500 surface feet per minute.

Fixtures Also Affected

It was pointed out that not only will machine tools need to be much more powerful and rigid to stand up under the strains imposed by such severe operating conditions, but that jigs and fixtures must undergo revision to permit quicker handling of work. Even with speeds possible at present, the production on many machines is limited by the ability of the operator to load and unload work, so if attainable cutting speeds are to be increased to the extent that the German maker's tests indicate, much more rapid handling of work to and from machines must be provided to get the full benefit from the development.

This meeting, which was held under the auspices of the Machine Shop Practice Division of the American Society of Mechanical Engineers, was entirely devoted to various problems arising from the use of machine tools, with bearing design and lubrication being given particular attention.

Considerable discussion was aroused by a paper presented by F. E. Cardullo, chief engineer, G. A. Gray Co., which offered a new theory for the lubrication of cylindrical bearings. In this theory more attention was given to the effects of leakage from the ends of bearings than to the velocity of the lubricant in the bearing, and these departures from classical lubrication theory brought forth a great deal of controversial discussion among the exponents of the various theories.

By means of his theory Mr. Cardullo reduced the following general considerations concerning the design and operation of bearings, they being particularly applicable to low speed bearings such as are commonly found in machine tools:

1. The load carrying capacity of a bearing is proportional to its diameter; to the operating viscosity of the lubricant; to the speed of rotation; to the surface speed of the journal; and is a function of its length.

2. The power loss in a bearing depends upon the eccentricity ratio, and is proportional to the square of the diameter; to the length; to the square of the speed; to the square of the surface speed of the journal; to the operating viscosity of the lubricant, and is inversely proportional to the operating clearance.

3. The rise in temperature of a bearing is independent of its length; is proportional to its diameter; to the operating viscosity of the lubricant; to the square of the number of revolutions per minute, and inversely proportional to the running clearance.

At the same session G. B. Karelitz of Westinghouse Electric & Mfg. Co. presented a paper on the grooving of bearings for machine tools. He pointed out that grooves placed indiscriminately might very seriously affect the operating efficiency of bearings and that the particular installation, the type of load and various other considerations must be taken into account before deciding upon how any particular bearing should be grooved. In general, Mr. Karelitz said, oil should be fed into a bearing at a point where the pressure is low or, preferably, where there is a vacuum, as on the "up-side" of a sleeve bearing.

In distributing this oil to the load carrying surfaces the latter should be cut up by grooves as little as possible because each groove introduces a point of no pressure and so tends to weaken and break down the load bearing film. Following a few general considerations of the problems involved, the paper entered into a detailed discussion of proper grooving of both horizontal and vertical bearings under varying load conditions.

Improvements Suggested

In a session devoted to a discussion of the use and application of machine tools in modern manufacturing methods, a paper prepared by L. L. Roberts, mechanical superintendent, Packard Motor Car Co., was presented which not only outlined the present state of progress in machine tool design as adapted for automotive use but which also suggested a number of improvements which might be made to still further increase machine tool usefulness.

Mr. Roberts stressed the point that the tooling of a machine tool was a very important item which was too often left to the user to solve. Inasmuch as tooling

arrangements have great influence upon the productive economies made possible by a new tool, he believed that the makers of the machines should display more interest in developing proper tooling, including in this category holding jigs and fixtures as well as the cutting tools.

Among the items which Mr. Roberts thought should be given consideration in developing tooling arrangements were provision for quick removal or adjustment of cutting tool set-ups and of piping carrying the cutting coolant. Holding fixtures should be easy to keep free from chips which interfere with proper seating of the work.

Who Should Tool Machine?

Commenting upon the difference of opinion as to who should tool up the machine, he cited the practice of his company as that of requesting bids for the complete job covering the tooling and methods to be employed as well as the machine tools. This frequently brings into competition entirely different types of equipment, such as milling machines and grinding machines, for the same job, and only in this way, the company believes, can it be sure that it is obtaining the best equipment available for the work.

By following this plan, Mr. Roberts continued, his organization is surface grinding a number of parts formerly milled which were difficult to clamp without springing under cut. Such parts as stamped crankcase gear covers, side wheel carrier brackets, exhaust and inlet manifolds, rear axle cases, motor inlet and outlet water flanges and rocker lever housings are being ground in surface grinders for as little as half the cost of milling.

A development in the other direction brought about by the recent availability of new tool designs was cited in the manufacture of Packard crankshaft counterweights. These were formerly forged, surface ground on two flat sides and the joint face and then counterturned in a lathe. For the production required four grinders and two lathes were needed.

Now, two high-powered milling machines with hydraulic feed are used to turn out the same production. One machine cuts the weights from bar stock, 16 at a time, while the second form mills the radius formerly turned in the lathes.

While minimum floor space is a desirable factor in machine tool design, Mr. Roberts said that production per man per hour is much more important and should be given first consideration. Individual motor drives are preferable, he believes, because while they are somewhat more costly to install they use less power than belt drives, make installation of conveyor chutes, etc., easier and greatly improve the appearance of the shop.

Packard Purchasing Policy

The Packard policy, Mr. Roberts said, has been to purchase without hesitation any machine or battery of machines which, when all the factors entering into manufacturing costs are considered, show that the new installation will pay for itself within a reasonable length of time through its greater efficiency.

Extensive repairs are not made on old and obsolete machines, the dividing line being when repairs are about half the cost of a new machine, according to Mr. Roberts. When repairs cost more than this a new machine is purchased unless the old machine is so highly specialized as to have little or no resale value and the new machine to replace it would produce no substantial savings.

The first technical session of the meeting was devoted to a discussion of aeronautic machine shop practice and Hugh W. Roughley, quality manager, Wright Aeronautical Corp., presented a paper on the inspection methods in use at that plant. Very close control is maintained over the quality of all materials entering into Wright engines and frequent inspections in all stages of work in progress assure good workmanship in the finished pieces.

A number of the more important engine components are given 100 per cent inspections after practically each operation and as a final check every completed part is given a final inspection before being sent to stores to await assembly.

The meeting was attended by about 250 production men and most of it was spent in a three-day cruise on the Ohio River, during which time an inspection visit was made to the American Rolling Mill Co.'s plant at Ashland, Ky., where the first continuous sheet rolling mill in the world has recently been installed.

This mill is of interest to automotive men not only because the processes employed are reminiscent of automotive assembly lines but more particularly because a very large share of its output consists of automotive sheets whose cost, according to mill officials, should be reduced considerably after the general adoption of this method of rolling.

Briefly, pigs of open hearth steel enter at one end of a mile-and-a-quarter of continuous rolls, reheating furnaces and conveyors, and almost entirely automatically, with only a few men watching the operations, pass through the lines and out the other end as finished automobile sheets ready for shipping. To anyone who has watched the rolling of steel sheets in the usual type mill the substitution of machine equipment for man power in this new installation is particularly striking and the possible production economies are self-evident.

Fuemer for Easy Starting

THE As-Ke Fuemer, made by the As-Ke Fuemer Co., 2921 Stevens Ave., So., Minneapolis, Minn., is a small, powerful electric heater about the size of a spark plug which vaporizes or fumes a small charge of gasoline in the carburetor the instant the starter pedal is applied to start the engine.

The Fuemer screws into a cup which is attached to the air horn of the carburetor. This cup is filled with gasoline by drain-back from the manifold or when the carburetor is choked for starting.

The new heating unit has heating elements of high grade resistance wire which are imbedded between three asbestos pads held together by a heavy mica sleeve. The whole is inclosed in a brass tube having a perforated cap. Gasoline contacts with the hot filaments through two 3/16 in. holes in the side of the Fuemer.

JOHN C. HOOF & CO., 162 N. Franklin St., Chicago, Ill., has developed a drilling, reaming and valve seating jig for use in installing the company's valve guides and seats in OX-5 and OXX-6 Curtiss airplane engines.

The equipment consists of a fixture for holding the cylinders at the proper angle; a jig with the necessary locating plugs, drilling and reaming bushings and a two-angle roughing cutter for breaking down the hard glass-like surface of old valve seats. Other items included are a milling cutter, finished refacing tool, a puller for installing valve seats and, in fact, everything required for the job except a drill press or a large electric portable drill.

In *the* Realm *of* Metallurgy—

Nitriding process is applied to wearing surfaces of steel liners for aero engine cylinders in France.

IN France the nitriding process (to which several references have been made in these columns recently) has been applied to the wearing surfaces of steel liners for aircraft engine cylinders, and the subject was referred to in a "note" by Dr. Leon Guillet to the French Academy of Sciences. Following is an excerpt from Dr. Guillet's paper dealing with the matter:

"Generally speaking, automobile cylinders are made of cast iron; recently cast iron containing nickel and chromium is sometimes used and in this way greater hardness, more marked homogeneity and better machining qualities are obtained. In aircraft engines, where the weight must be as small as possible, steel is used—most frequently a medium carbon steel, which after heat treatment shows a tensile strength of 142,000 lbs. p. sq. in. The water jackets are made either of sheet steel or aluminum.

"Whatever procedure is followed, the cylinders always wear quite rapidly, due to the friction of the cast iron or, the more common aluminum-alloy pistons. The efficiency of the engine decreases, oil consumption goes up and the engine becomes noisy in operation.

"A test of a nitrided steel sleeve was suggested. The steel employed was of the following analysis:

C. 0.35 Cr. 1.60 Al. 1.20

The metal after quenching and drawing to a temperature above 1112 deg. Fahr. shows a tensile strength of 128,000 lb. p. sq. in.

"The manufacturing process employed can be summarized as follows:

"The cylinder is first rough-machined to within 0.080-0.160 in. of finished dimensions. In this state the part is given a quench and draw and it will then show a tensile strength of 128,000-135,000 lb. p. sq. in. After this treatment, the outside is nearly finished, a certain amount of material being left which is removed after hardening. The bore is brought almost to the finish dimension, leaving only 0.004 in. for straightening after hardening.

Outside Protected

"The outside is protected against nitriding so as to be able to finish-machine without grinding after the hardening. The parts are then nitrided to a depth of 0.024-0.028 in.

"After hardening, the parts are again machined. The protected outside is first finish machined; then the bore is rectified. The cylinders are then put in the blocks.

"This procedure yields cylinders of extreme hardness which cannot be filed and are perfectly interchangeable.

"Nitriding insures that they will keep their very great hardness, even after the heating which they undergo during normal running of the engine. The temperature normally reached by these cylinders is, however, quite below that permitted by these nitrided steels, whose hardness does not change up to 930 deg. Fahr.

"Cylinders nitrided in this way work equally well with cast iron or aluminum pistons. Pistons and rings are perfectly polished in contact with the hard surface of the cylinder and wear disappears nearly entirely.

Results of Measurements

"The normal oil consumption of the engines decreases and remains very low, even after prolonged running. Following are some results of measurements:

(A) Wear of cylinders—

1. Wear on car with cast iron cylinders after 18,750 miles, 0.016 in.
   Wear on car with nitrided cylinders after 18,750 miles, 0.0008 in.
2. Aircraft engine after 100 hours' running—
   Wear of cylinders of heat-treated steel, 0.0032 in.
   Wear of nitrided cylinders, *nil.*

(B) Oil consumption (same conditions) per hp.-hour—

	New Engine	After 100 Hours
Cylinder of heat-treated steel	.009-.011 lb.	.048-.060 lb.
Cylinder of nitrided steel (1)	.009-.011 lb.	.009-.011 lb.

1. These figures have just been confirmed in a race by Weymann at Indianapolis. His car carried nitrided cylinders. The oil consumption for 19 hours on the Indianapolis track and under very hard running was less than 4 qt.
   Finally it is to be noted that nitrided cylinders permit the successful use of magnesium-base-alloy pistons.
2. Crankshafts.

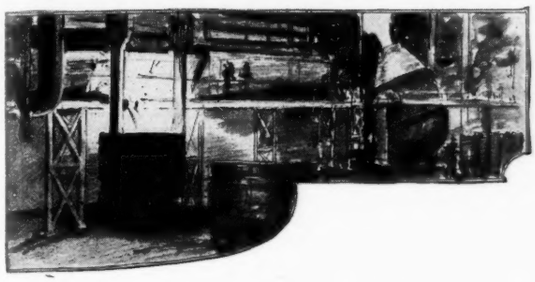
"I have already pointed out how interesting the use of nitrided steels is in the case of certain shafts, notably camshafts. Attention must be called to a new and very interesting fact.

"The hardness of nitrided special steels can produce a very remarkable polish which changes the friction conditions entirely. Aluminum alloys can bear directly on nitrided and polished steels without fear of wear or seizing. Engines are actually running with crankshafts of special nitrided steel without bronze or babbitt bearings. Similarly, nitrided and polished piston pins can be mounted directly in duralumin connecting rods.

"In a recent test, when the connecting rods were mounted directly on a nitrided crankshaft a gain of 10 per cent in power was obtained at 3000 r.p.m. and the maximum speed was increased to 4000 r.p.m."

Steels for nitriding are now being manufactured in

New Processes *and* Materials



Investigations show cadmium-zinc alloy superior to 60:40 tin-lead mixture as used for soldering purposes.

the United States by the Central Alloy Steel Co. of Massilon, Ohio, and the Ludlum Steel Co. of Watervliet, N. Y.

Chrome Plating in England

DESPITE a desire to reduce rather than increase their production costs and to avoid any but essential further capital expenditure, several British passenger car makers have realized that they can no longer delay in adopting chromium plating. Three prominent firms already have the necessary plant and equipment installed, while eight or 10 others are on the point of signing contracts for its installation.

There is no doubt that the fact that a majority of American cars are now being chromium-plated has hastened the decision of these firms to superimpose a chromium deposit on nickel. The change will result in several cases in a variation in radiator construction, for on those cars where hitherto the radiator shell has been of polished white-metal ("German silver"), a chromium-plated steel shell will be used, either integral with or separate from the core and tanks. For this reason one of the largest radiator makers is having the necessary equipment installed. The plating requirements of the smaller automobile makers are being catered for by two or three firms who are specializing in chromium plating.

Cadmium-Zinc Alloy

ACCORDING to investigations made at the National Physical Laboratory of England and reported on in a paper presented to the Institute of Metals at its fall meeting by C. H. M. Jenkins, a cadmium-zinc alloy has the advantage of considerably greater strength over a 60:40 tin-lead alloy, both alloys being used as solders. The tensile strength of the cadmium-zinc alloy as ordinarily determined is approximately four times that of the tin-lead solder, but under prolonged stress tests the values obtained are approximately six times as great.

The comparative strength of joints soldered with these two materials had been already investigated by Deeley, who showed that the cadmium-zinc alloys possess shear strengths of 7-8 tons p. sq. in. in the film state, whereas the tin-lead alloy showed no more than 4 tons p. sq. in. This advantage is slightly offset by the somewhat higher soldering temperature, which, however, is not such that there is any greater likelihood of lowering the strength of cold-worked steel. A consideration of the subject indicates that the advantages of a stronger material may be outweighed if imperfect joints are produced occasionally.

The ultimate life of a sound joint does, however, depend upon the resistance to failure of the solder itself under the prolonged application of stress. It was on this account that the two materials referred to were investigated.

The 60:40 tin-lead alloy has a liquidus point of 374 deg. Fahr., while the cadmium-zinc eutectic alloy containing 82.6 per cent of cadmium by weight melts at 511 deg. Fahr.

The occurrence of flow of soft metals under the prolonged application of stress at room temperatures is common knowledge, but comparatively little is known regarding the numerical values of the stresses at which various metals and alloys commence to flow, and still less of the effects of previous mechanical or thermal treatment. Mr. Jenkins' paper contains the results of tests, some of which extended over more than a year, which show that quite low stresses will cause these softer materials to deform, but the data show that very large differences may exist between the values obtained for cast, roller, or annealed materials respectively.

The following conclusions were drawn from the tests:

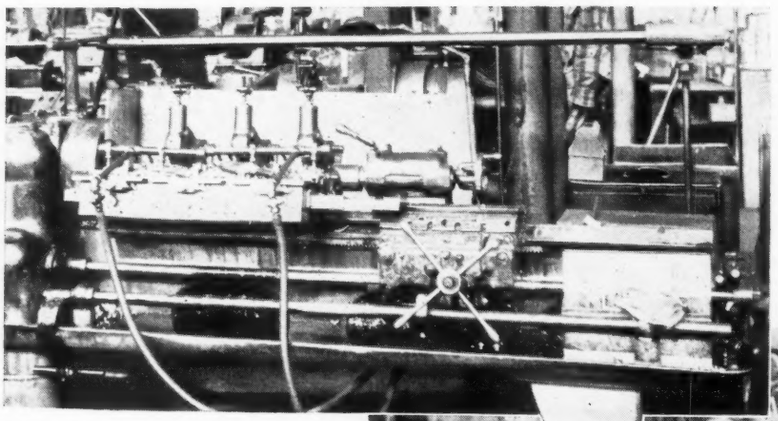
Marked differences in the tensile strength and in the resistance to prolonged stress are found between the cadmium-zinc and the tin-lead alloys. The usual tensile tests do not indicate clearly the respective merits of the two materials. The present results show that the rolled tin-lead solder possesses a low resistance to stress. A stress in tension of under 100 lb. p. sq. in. is sufficient to produce failure within a year.

Tests carried out at 120 deg. C. show that the resistance of these alloys to prolonged stress is reduced to approximately one-tenth of the values found at atmospheric temperature.

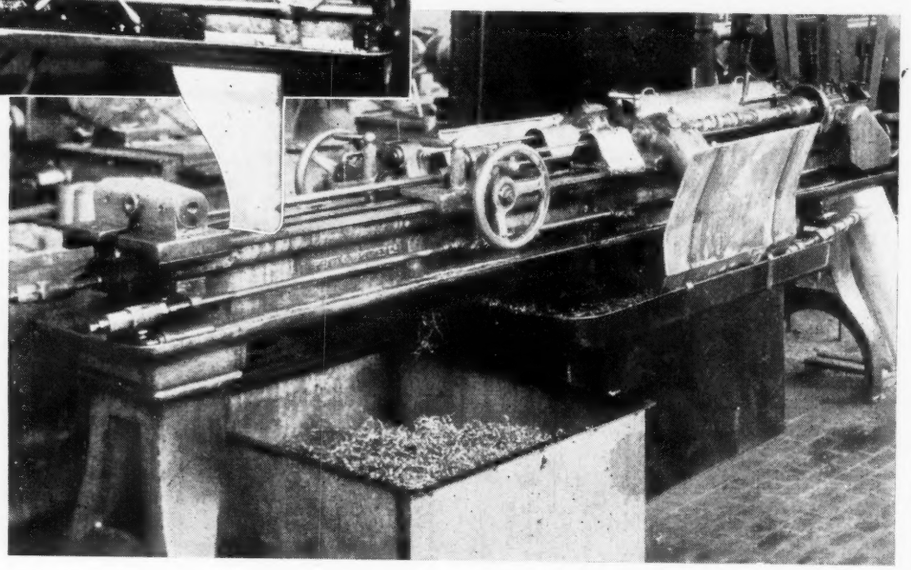
The relative strength under prolonged loading has been determined. The values show that the cadmium-zinc alloy requires six times as great a load as a tin-lead specimen in order to produce the same rate of deformation.

None of the cadmium-zinc specimens showed intercrystalline cracking, but one tin-lead specimen at 120 deg. C. (248 deg. Fahr.) showed this phenomenon for a portion of the test.

In both materials there is a marked difference between the results on rolled and on cast material. To some extent this is accounted for by the permanent lowering of the recrystallization temperature as a result of working the alloys. There is also a much smaller grain-size in the rolled material, which may assist the more rapid flow. The cast eutectic alloys also possess an intrinsic hardness greater than that derived from the law of mixtures.



Left—Three Lo-Swing lathes are employed to turn all bearings and the distributor gear blank, to face the sides of cams and bearings and to turn the space between the cams



Reo camshafts are drilled through their entire length in this Morley gun drill shown at the right

Reo Camshaft Machining Practice Has Interesting Features

Particular machines used and sequence of operations differ somewhat from means customarily employed.

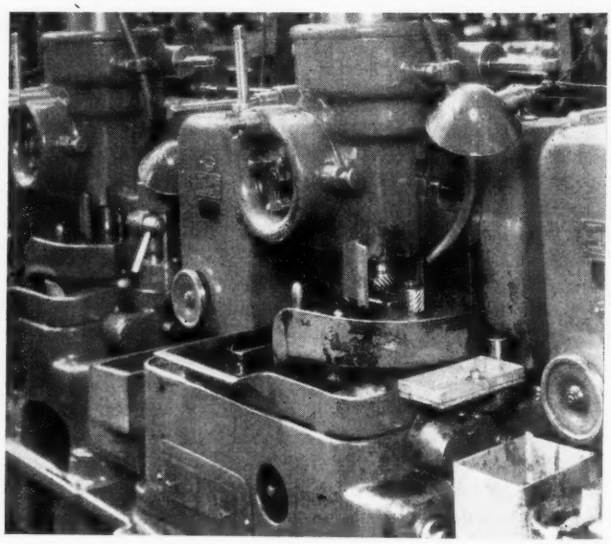
MACHINING operations on camshafts used by the Reo Motor Car Co. are, in general, similar to those employed in many automotive plants. The particular machines used, however, and the sequence of operations are somewhat different from customary practice so that a detailed description of the production routing may be of general interest.

The camshaft forgings are heat treated at the Reo plant in Lansing before any machine operations are performed. This heat treatment consists of heating the shafts to 1675-1700 deg. Fahr., quenching in water and then drawing at 950 to 1200 deg. Fahr. Brinell hardness varies from 123 to 179.

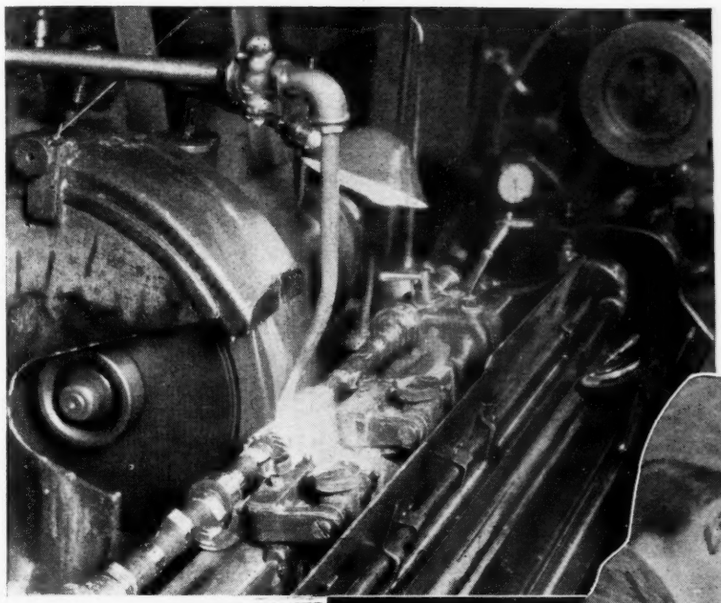
The first machine operation after the heat-treated forgings have been rattled to remove loose scale is done in a Cincinnati miller where the shaft is cut to length and both ends milled. A double-head centering machine is employed next to center both ends in preparation for the many lathe operations to follow.

After a rough straightening operation performed in a flexible power press the shaft is turned for a steady rest in a Lodge & Shipley lathe.

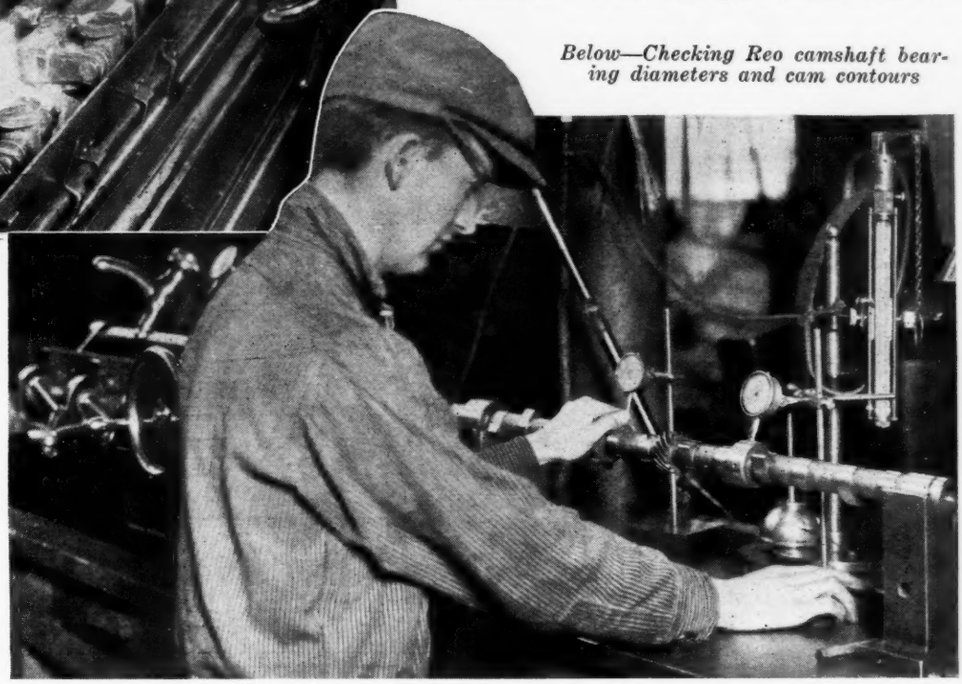
Three Lo-Swing lathes are used for the next opera-



Distributor gears on the camshaft are cut in a Fellows gear shaper



Above—Cams are ground in Norton grinding machines



Below—Checking Reo camshaft bearing diameters and cam contours

tions. In the first the front and the two center bearings and the distributor gear blank are turned. In the second Lo-Swing lathe the sides of all cams and bearings are faced while in the third machine the space between the cams is turned.

The shaft is then copper-plated and straightened in a Reo-built hand press. The rear bearing and the oil groove at that end are turned in a LeBlond lathe and in a second lathe of the same make the gear fit is turned and undercut.

A ½ in. hole is next drilled through the entire length of the shaft with Pratt & Whitney gun drills. In a Barnes drill the rear end is counterbored and recentered and the front end is drilled with a 9/16 in. hole 1¼ in. deep, tapped and recentered.

Four oil holes are drilled in the next operation which is done in a Leland-Gifford two-spindle drill press. The centers at both ends are turned to an angle of 60 deg. in a Star lathe after which the oil holes are countersunk in another L-G drill.

The second bearing is rough ground in a Norton grinder with a tolerance of plus 0.002 in. In another Norton the gear blank is ground and then follow rough grinding of the first and third bearings, all in Norton grinders and all being held to plus 0.001 in. tolerance, minus 0.000 in.

A Pratt & Whitney hand milling machine is brought into use next for milling a keyway in the front end of the shaft, after which the contour of all cams are turned in a single operation in a Melling automatic cam lathe.

The teeth of the distributor gear are cut in a Fellows gear cutter, the shaft is washed and cleaned and the gear painted with a copper solution preparatory for the case hardening to follow. Both ends of the shaft are plugged with copper plugs and the unplated parts are carburized 0.06 in. deep. After finish grinding the scleroscope hardness must be 80 minimum.

After the hardening operation the shaft is placed in a hand straightening press where it is cleaned and polished and rough straightened. It then passes to another flexible power press where the shaft is finish straightened to within a total tolerance of 0.001 in.

Finish grinding operations follow this, all of them being performed in Norton grinding machines. In the first operation the sides of No. 1 bearing and the thrust washer bearings are ground. The second operation finish grinds the gear fit and the side thrust bearing.

The front bearing is ground next with a permissible tolerance of minus 0.001 in. Then follow in order finish grinding of Nos. 2 and 3 and the rear bearings, in all of which dimensions must be held within a tolerance of minus 0.001 in.

The cams are both rough and finish ground in a single operation in another Norton grinder, the maximum variation in the height of each cam being plus or minus 0.005 in. while the bodies of the cams must run true within 0.001 in.

The final operation is performed in a Greaves & Klusman lathe in which the camshaft is burred, cleaned and polished preparatory for final inspection.

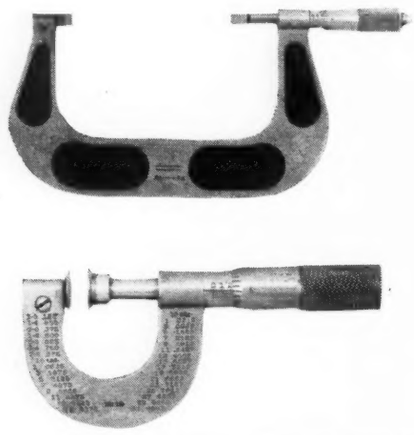
THE Areo Co. of Reval, which is operating the Reval-Helsingfors air line, plans to place large seaplanes in service next year, with a capacity for eight passengers. The machines now in use in the service can carry only four passengers.

The same concern, moreover, is planning the creation of a new line between Reval and London next spring, by way of Finland and the Scandinavian countries. The trip will take about 12 hours and cost 300 crowns or about $80, while the trip by railway, first class, costs $137 and takes four days.

NEW DEVELOPMENTS—Automotive

Micrometer Calipers

BROWN & SHARPE MFG. CO., Providence, R. I., has developed two special micrometer calipers designed particularly for measuring forming tools. One caliper is of the disk anvil type and is designed for measuring the thickness of forms, while the other is of the blade anvil type for measuring the diameter of forming tools and the depth of narrow grooves.



New Brown & Sharpe micrometer calipers for measuring forming tools

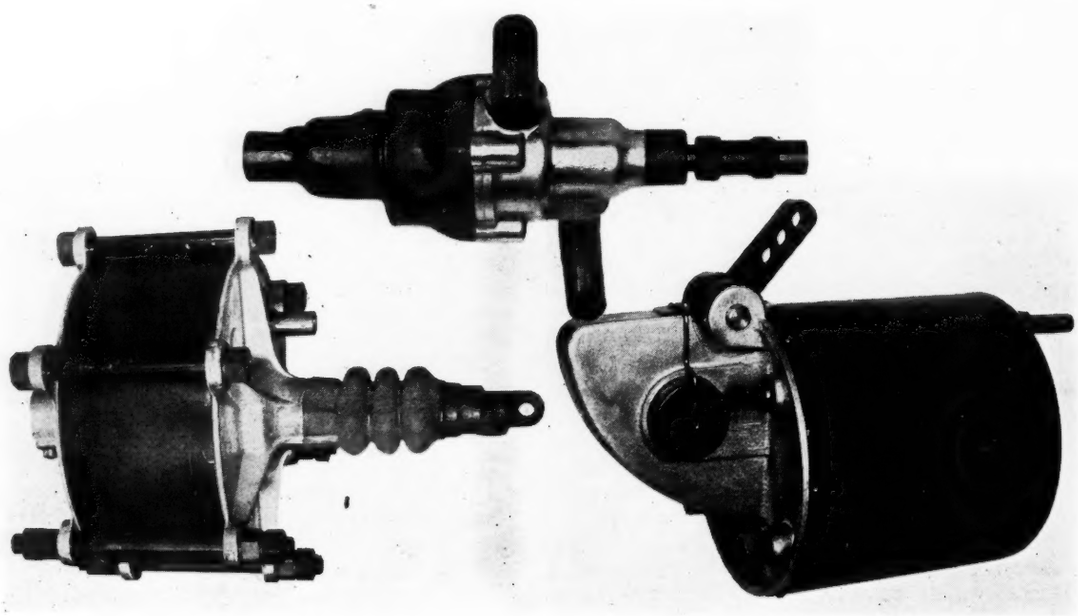
The disk anvil type calipers are fitted with disks ½ in. in diameter and 1/16 in. thick at the center and 0.020 in. thick at the outer edge. With this instrument, forms up to ⅛ in. thick and over 0.020 in. in width can be measured. One size only is provided which measures from 0 to 1 in. in steps of thousandths of an inch.

The blade anvil type has blades 0.030 in. thick which permit measurement to be taken in slots or grooves having a depth up to 7/32 in. This type is made in sizes which permit measurements from 1 in. to 4½ in. by thousandths.

New B-K Booster Brakes

TWO new models of the B-K booster brake have been placed on the market and are illustrated herewith. One of them has a 2:1 internal reduction incorporated in it and is applicable to both two-wheel and four-wheel brakes. The reason for fitting the booster with a 2:1 reduction is briefly as follows: In order to get all the braking power needed with a moderate size of vacuum cylinder, a considerable reduction of motion is required between the vacuum cylinder piston and the brake lever. Ordinarily this reduction is obtained by means of the regular brake linkage or hookup, but in passenger cars it is not always convenient to obtain the necessary large reductions, besides which a large reduction linkage tends to clutter up the chassis. Therefore, a 2:1 reduction is combined with the vacuum cylinder and is completely inclosed.

In the original B-K booster for two-wheel brakes the valve mechanism was incorporated with the vacuum cylinder. This results in a construction of considerable length, for which it is not always possible to find room on the chassis. For this reason a design has been evolved in which a separate valve, similar to the one used in connection with the four-wheel brake booster, is employed. The valve is of the floating type, a rod



At top—Vacuum valve for use with the P.B.L. cylinder. Lower left—Type P.B.L. booster cylinder, which is shorter than the usual design. Lower right—Type F-W booster cylinder with 2:1 inclosed reduction

Parts, Accessories and Production Tools

from the brake pedal entering it at one end and a rod connecting to the brake rigging leaving it at the other. When there is no vacuum the pedal effort is transmitted through the valve directly to the brakes. The brake cylinder is rigidly supported on the chassis and its piston rod is connected to the brake rigging in the usual way.

These new products of the Bragg-Kliesrath Corp., Long Island City, N. Y., were shown to the public for the first time at the American Electric Railway Association show in Cleveland.

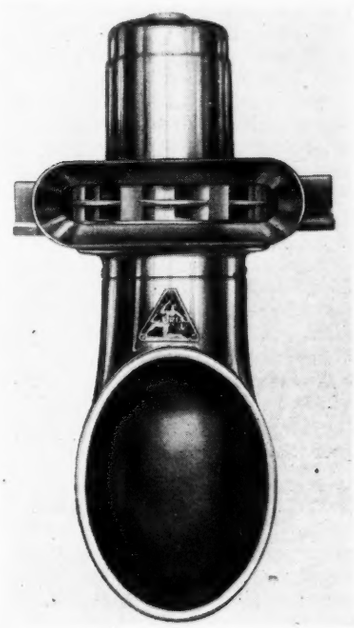
Spark Plug Improvements

CHAMPION SPARK PLUG CO., Toledo, Ohio, has recently announced improvements in its line of spark plugs including the No. 8, the truck special and the Aero-9. In the No. 8 plug the sillimanite core has been changed both in processing and design to increase mechanical strength and ability to withstand high temperatures and shock. Gaskets have been made more resistant to change under severe operating conditions. The firing chamber has been changed to improve heating and fouling conditions.

The Aero-9 spark plug is now designed so that it cannot be broken in a way to interfere with engine operation, and failure to fire has been made practically impossible. In this type of plug sillimanite is used in both the primary insulator and in the protecting dome insulator. Improvements made in the truck special are similar to those made in the No. 8 plug.

"Luren" Motor Vehicle Siren

MARKETED under the trade name "Luren," which has been used to identify other signal and alarm apparatus designed and developed by Christian A. Volf, Jr., 366 Madison Ave., New York City, a new-type siren is being made in three sizes, one for fire apparatus, one for motorcycle patrol use, and one for locomotive service. Each has a distinct difference in sounding characteristics for ready identification in traffic.



New Luren siren for motor vehicles

The siren is featured by two separate horns and an entirely inclosed sounding box, the intake mouthpiece being three times the size in square inches of the exhaust mouthpiece. Thus the influx of air currents through the intake horn is far greater than into the exhaust, and the velocity of air currents passing out through the exhaust mouthpiece, which is part of the sounding box, is more than double the velocity of the speeding vehicle. Therefore the opposing air current has no effect at the exhaust and the sound is forced directly ahead, enabling accurate detection of the direction from which the vehicle is approaching.

Acetylene Generators

THREE pressure type acetylene generators for cutting and welding have been placed on the market by the Oxweld Acetylene Co., 30 E. Forty-second St., New York. The type MP-2 is built in two sizes having 50 and 100 lb. carbide capacity, while the type MP-3 has 300 lb. carbide capacity and is an entirely new size in this line of products.

All three generators are suitable for supplying pressure type or medium pressure welding and cutting blowpipes. Type MP-2 is similar to former generators but has improved feed mechanism, a new regulator, a simplified hydraulic pressure valve and two new design relief valves. The other model is similar in general design and operation to the MP-2 type.

New Oxweld medium pressure generator

Ammco Cylinder Grinders

THE Automotive Maintenance Machinery Co., 816 W. Washington Blvd., Chicago, Ill., is offering Ammco rigid cylinder grinders in two models, one of which—the model E—is new. It is similar to Model D which has been on the market for some time except that it is provided with an external dial adjustment. This is mounted at the top of the grinder shank where it can be adjusted without interfering with cylinder head studs.

First with the News

Reliable and Accurate

News of the Industry

PAGE 494. VOLUME 59 *Philadelphia, Saturday October 6, 1928* NUMBER 14

High Production Schedules to Continue in October

PHILADELPHIA, Oct. 7—Entering the last quarter on a scale of operations comparable to the high level in the third-quarter, automobile factories will continue at an active though gradually diminishing rate through October. Marked reductions will probably take place in November and December, due to manufacturing changes in a number of large producing plants in preparation for 1929 business.

With the high September total, production in the first nine months this year has exceeded the entire 1927 total by about 100,000 and is about equal to the nine months' period in 1926, the industry's record year. To establish a new production total this year the industry must exceed the 790,000 total set up in the final quarter of 1926. Present indications are that production in the final quarter this year will approximate 1,000,000.

Retail sales conditions generally in September showed a decline from the earlier months of the quarter, a decline that was marked in some of the large Northeastern centers and more gradual in other sections. In the sections in which reduced business was most marked, the decline was adduced to a concentration of dealer effort to the moving of used cars before cold

(*Turn to page 500, please*)

Gardner Chairman of Parks' Aircraft

ST. LOUIS, Oct. 4—Details concerning Parks' Aircraft, Inc., a $2,000,000 concern formed by officers of the Gardner Motor Co. and Parks' Air Lines, Inc., to manufacture a popu.ar priced monoplane were announced this week by Russell E. Gardner, Jr., president of Gardner Motor Co. Construction of a plant costing $175,000 will begin immediately at Parks' Airport near East St. Louis.

Officers of the new company are: Russell E. Gardner, chairman of the board; Harry P. Mammen, president; Oliver L. Parks, vice-president and general manager, and Fred W. Gardner, executive vice-president. Mr. Mammen is president and Mr. Parks, vice-president, of Parks Air Lines, Inc. The two companies will have no official connection.

September Output Estimated 460,000

NEW YORK, Oct. 4—Production of automobiles during September of the current year is estimated by the National Automobile Chamber of Commerce as 460,000. This figure indicates a continued high scale of production, comparing with 271,649 for the corresponding month last year, although it does represent a slight drop from August of this year when the production was 489,758.

Reo-Mack Negotiations Wait Final Considerations

NEW YORK, Oct. 4—Negotiations looking toward the merger of Mack Trucks, Inc., and Reo Motor Car Co. have recently been under way but no definite conclusions have been reached as yet. Officials of Mack feel that such a merger would be highly advantageous to both companies, but it is still very uncertain whether any definite results can be obtained from these negotiations.

Chrysler to Build in Canada

DETROIT, Oct. 4—A 70-acre tract of land between Ford and Windsor, Ont., has been purchased by the Chrysler Corp. of Canada, Ltd., on which it will erect a $1,500,000 plant soon. The present Windsor plant, acquired in 1924, will be kept in operation as parts factory. When the new unit is completed it will raise the Chrysler Canadian output from 150 cars a day to 365.

Doehler Buys Metal Mold

NEW YORK, Oct. 3—Doehler Die Casting Co. has purchased from the Metal Mold Castings Co., Buffalo, its permanent mold casting equipment, dies, molds and other relative tools, and will add these to present facilities.

48 Car Producers Draw Show Space

NEW YORK, Oct. 4—Exhibition spaces for the forthcoming New York show were drawn by 42 producers of American cars, five foreign car manufacturers and one American taxicab company at National Automobile Chamber of Commerce headquarters today. Two cars shown last year, Falcon and McFarlan, will not be in the 1929 show, but De Soto and Plymouth will appear at their first national shows, and Roamer will make a reappearance.

The foreign cars to appear are Austin, Daimler and Vauxhall by British makers; Mercedes-Benz, Germany, and Renault, France.

National Safety Council Studies Accident Causes

NEW YORK, Oct. 4—Safety engineers, plant executives and public officials from all over the country are convened in New York this week at five of the largest hotels in the seventeenth annual safety congress. The meeting was opened Monday with an annual meeting of the members which was welcomed by Alfred H. Swayne, vice-president of General Motors, and chairman of the local committee. The reduction of accidents in industrial plants, in the home and on the highway is being considered by the National Safety Council all this week.

Among the speakers of the automotive division speaking on the industrial phases of accident prevention are E. H. Cotcher, superintendent of safety, Murray Corp. of America; J. H. Juhl, superintendent of planning, Chrysler Corp.; R. E. Abbott, Fisher Body Corp., and several representatives of pyroxylin lacquer manufacturers.

Murray to Triple Stock

DETROIT, Oct. 3—A special meeting of stockholders of Murray Corp. of America has been called for Nov. 15 to vote an increase in the authorized capital stock to 900,000 shares.

Factory Production High in September

Some Decline Noted From August But Increases Over 1927 Are General

DETROIT, Oct. 3—Reports on September production by leading manufacturers show large increases over September last year, but lower totals than in August this year. The decline from August in most instances is small and to some extent is accounted for by fewer working days, this being emphasized by the fact that some factories were unable to meet all their orders.

Chevrolet Motor Co. built 105,616 in September as against 62,015 in September, 1927. Production in the first nine months now totals 1,100,723 as against 652,754 in the same period last year. Large scale operations will be continued in October.

Studebaker Corp. of America built 12,500 in September as against 15,000 in August. Nine months' production now exceeds the entire year 1927.

Buick Motor Co. built 26,742 units in September as against 27,000 in August. The October schedule is for 28,000.

Graham-Paige Motors Corp. production in September was 6700 as against 11,200 in August. Production for the first nine months totals 65,486 against 21,881 for the entire year 1927. The third quarter total was 26,742.

Hupp Motor Car Corp. shipped 6536 cars in September as against 7023 in August and 2456 in September last year. Nine months' shipments total 63,919 as against 29,906 in the 1927 period. The company carried 1400 orders into October.

Hudson Motor Car Co. shipped 20,000 cars in September against 22,000 in August. Shipments for the year to date approximate 250,000, a 10 per cent gain over the 1927 output.

Cadillac Motor Car Co. shipped 5000 cars in September, approximating the August rate. Capacity production will be continued in October and November.

Olds Motor Works shipped 9301 units in September as against 7773 in August and 7127 in September last year.

Nash Motors Co. shipped 20,606 units in September, an increase of 8700 over September last year.

Oakland Motor Car Co. shipped about 18,000 cars in September bringing the nine months total to about 224,000.

Packard Motor Car Co. built about 5000 cars in September and is continuing at this rate.

Reo Motor Car Co. built 3711 units in September as against 4823 in August. October schedule is for 4000 units.

Simonds Worden White Organized in Dayton

DAYTON, Oct. 3—The Simonds Worden White Co. has been formed through a consolidation of the A. A. Simonds-Dayton Co., this city; L. & I. J. White Co., Buffalo; Worden Tool Co., Cleveland, and R. J. Dowd Knife Works, Beloit, Wis. The consolidation has been effected to give customers better service and to enlarge facilities for meeting customer requirements. All plants will be continued and orders will continue to be received and filled from the plants with which customers have been associated.

Light Truck Demand Brings Total High

NEW YORK, Oct. 4—Predicting the continuance during the remaining months of 1928 of the high motor truck production which has marked the first eight months, A. J. Brosseau, chairman of the motor truck committee, National Automobile Chamber of Commerce, in a review of truck prospects just issued foresees the possibility of 1928 equaling if not surpassing the record year of 1925.

"The gains made this year," says Mr. Brosseau, "are due chiefly to the notable increase in fast, light trucks having a capacity of 2 tons or less than 2 tons. The largest gain in the light truck field has been in the 2-ton class, in which 21,230 trucks were produced in the first eight months of 1928, as compared with 13,990 in the same period of 1927. The next largest gain was made in the ½-ton class, with the 1-ton and ¾-ton classes following. It may be interesting to note in passing that of the 377,954 trucks produced in the first eight months of this year, about 240,000 or more than half, were trucks of 1-ton capacity.

"Foreign countries have been absorbing trucks made in the United States and Canada at a record rate this year, 101,928 having been exported during the first eight months. This compares with 90,343 trucks exported during the first eight months of 1927."

Ford Building 5000 Daily

DETROIT, Oct. 2—Ford Motor Company is making slightly more than 5000 cars a day and production is slowly but steadily increasing every day, according to an official of the company. Approximately 400,000 of the new Model "A" Fords have been produced. The company is now employing approximately 125,000 men in the Fordson and Highland Park plants. This is the largest employment in Ford's history.

Goodyear Gets Navy Award

WASHINGTON, Oct. 4—The Goodyear Zeppelin Co. of Akron, subsidiary of the Goodyear Tire & Rubber Co., has been awarded the contract for the construction of the two new mammoth Navy dirigibles at a price of $7,950,000 each, including a hangar, the Navy Department has announced. The award was made over the protest of the American Brown-Boveri Electric Corp. of Camden, N. J., the formal objection to the award having been overruled by a special Navy board, analyzing the bids.

Business in Brief

Written by the Guaranty Trust Co., New York, exclusively for AUTOMOTIVE INDUSTRIES.

NEW YORK, Oct. 4—All seasonal goods in the jobbing and retail trade have been stimulated by the cool weather, and the demand for dry goods, clothing and silk fabrics is especially heavy. The combined September sales of two large mail-order houses showed an increase of $9,827,706 over the combined figure for the corresponding month last year. This was the largest monthly gain reported by these two firms so far this year, despite the one less working day in September this year than last.

FREIGHT CAR LOADINGS

Car loadings for the week ended Sept. 15 amounted to 1,138,312 cars, which marks an increase of 147,270 cars above the figure for the preceding week. Although this large gain in car loadings is partly the result of the observance of the Labor Day holiday in the week ended Sept. 8, nevertheless, the loadings for the week ended Sept. 15 were the highest for the current year to date.

PETROLEUM PRODUCTION

The estimate of the average daily crude oil production for the week ended Sept. 22 was 2,508,850 bbl., as compared with 2,504,900 bbl. for the week before, showing an increase of 3950 bbl.

FISHER'S INDEX

Professor Fisher's index of wholesale commodity prices for the week ended Sept. 29 was 99.3, which compares with 99.8 the week before and 100.3 two weeks before.

BANK DEBITS

Bank debits to individual accounts outside of New York City for the week ended Sept. 26 were 11 per cent above the figure for the corresponding week last year.

STOCK MARKET

The stock market showed some irregularity during the week ended Oct. 2, and undoubtedly much of this was the result of profit-taking. Nevertheless, the volume of trading was heavy and additional new highs for the year were reached. Professor Fisher's index of stock market prices for the week ended Sept. 28 was the highest reached so far this year. Brokers' loans for the week ended Sept. 26 increased by $54,232,000, although such loans placed by New York City banks for their own account decreased by $75,647,000. The call money rate advanced to 10 per cent on Oct. 1, the highest level it has reached since the first week in July of this year.

FEDERAL RESERVE REPORT

The combined statement of the Federal Reserve banks for the week ended Sept. 26 showed decreases of $83,100,000 in holdings of discounted bills and $44,700,000 in member banks' reserve deposits.

Stutz Makes Radio Optional on Cars

Sets Will Be Built Into Car and Operated from Storage Battery

INDIANAPOLIS, Sept. 29—All Stutz cars at the option of the purchaser will be equipped with a six-tube radio set, it was announced today by the Stutz Motor Car Co. of America, Inc. All models soon will be available with the new equipment but deliveries are being made on only the five-passenger sedans and broughams.

The set adopted has been undergoing tests in Stutz factories for more than two years, and special shielding has been developed so that neither the operation of the generator nor the distributor affects the reception.

The set is built into the instrument board and is entirely hidden except for the dials and controls grouped compactly on the instrument panel. A miniature loud speaker is located on the top of the windshield while the antenna is concealed in the top. The set operates from the car storage battery using about 1½ amp.-hrs.

Mullins Expands Plant, Denies Murray Merger

SALEM, OHIO, Sept. 29—Announcement made this week by C. C. Gibson, president of the Mullins Manufacturing Co., of plans to increase the plant capacity to permit a 50 per cent increase in production, marks a sharp increase in business by this company during the year. The addition is expected to be ready by Jan. 1 and will include among its equipment 10 modern double action presses. The Mullins company, formerly the Mullins Body Corp., owns about 28 acres of land and has three plants with 60,000 sq. ft. of floor space. It employs about 1200.

The program of expansion follows important contracts received the past 30 days. President C. C. Gibson denied rumors of a merger with the Murray Corp. of America, Detroit.

It is understood that Harold A. Barker, New York banker, who was elected chairman of the Transue & Williams Co. this week, is a large stockholder in the Mullins company. Mr. Barker and Mr. Gibson have been named directors of the Murray corporation, Mr. Barker being chairman of the board.

Belgian Buying Resumes

WASHINGTON, Sept. 29—New models of American automobiles are steadily increasing in popularity in Belgium after an unusually brief slack summer period, the Department of Commerce is advised by its Brussels office. Competition is keen among American makes while local industry is reported quiet. Fabrique Nationale workmen are still on strike with 3600 out and 3200 working, though the strike is expected to end in the near future.

Australian Farmers Plan Tractor Work

WASHINGTON, Sept. 29—With one of the most successful agricultural exhibitions just completed at Wimmera, in the State of Victoria, Australia, when 2500 farmers attended, interest in farming by the modern tractor method is at a peak, according to advices received by the Department of Commerce from its office at Sidney. Practically all tractors displayed at this center of one of the best known wheat-growing districts of the country were of American manufacture and Australian farmers are evidencing keen appreciation of the benefits of tractor work.

Van Norman Organizes Sales Under Hunderup

SPRINGFIELD, MASS., Oct. 1—The Van Norman Machine Tool Co. has announced its withdrawal as of today from a selling agreement given the Van Dorn Electric Tool Co., and the establishment of its own selling organization. A policy of restricted distribution through jobbers only will be followed and a complete sales and service organization is now in the field.

Leo F. Hunderup has been named sales manager of the company. He has been affiliated in the past with Bonney Forge & Tool Works, Walden Worcester, Bastian-Blessing Co., Stewart-Warner, and Van Dorn.

The Van Norman line will consist of its valve tools and piston grinders plus several new items, and also will include automotive distribution of Stanley electric tools and Stanley-Atha small tools and other items manufactured by the Stanley Rule & Level plant, New Britain, Conn.

Indian Makes Ventilator

SPRINGFIELD, MASS., Oct. 1—A new ventilating device for closed cars is being put on the market by Indian Motocycle Co. It is attached to the top of the window and by the forward movement of the car fresh air is drawn in through a tube at the front end and impure air expelled at the rear end of the device. Ordinarily two windows of a car would be equipped with these units. This forms the second in the line of accessories started with the manufacture of the Indian Shock Absorber. It will be sold through the same channels as the first introduction.

Gears & Forgings Opens Offices

CLEVELAND, Oct. 1—Headquarters of the executive offices and sales, engineering and planning offices of Gears & Forgings, Inc., have been established at the Cleveland division where a new administration building has been erected.

Oakland to Sponsor Course in Servicing

Students Selected by Dealers to Study at G.M. Institute in Flint

DETROIT, Oct. 2—The Oakland Motor Car Co. is opening a new department of instruction in the General Motors Institute of Technology at Flint. The department will be known as the Cooperative Oakland-Pontiac Service Course and will train young men in service work in the same manner as the present management engineering cooperative course trains them in factory management and engineering.

The company has selected 50 students from all sections of the country who have been presented by local dealers. They must be high school graduates and will spend four years in the course, alternating between four weeks study at Flint and four weeks actual experience in the Oakland-Pontiac factories at Pontiac.

Oakland officials who will direct the work in the factories are president, A. R. Glancy; W. R. Tracy and Gordon Lefebvre, vice-presidents; E. H. Kramer, director of personnel; R. A. Armstrong, service manager; J. H. Otis, assistant service manager, and R. A. Andree, director of education.

Goodrich Rubber Offers New De Luxe Balloon Tire

AKRON, Sept. 29—Third of the larger companies to manufacture a super tire, the B. F. Goodrich Rubber Co. has added the Silvertown De Luxe balloon tire. The new tire has been in process of manufacture more than a year. The only distinguishing feature in the tread design of the new De Luxe is a slight beveled projection of the familiar Silvertown button farther down the side wall. The new tire is larger in cross-section and outside diameter.

According to Goodrich tire engineers the cushioning of the highest grade rubber is heavier between the six plies (two seven-inch sizes contain 8 plies) of fabric, and the fabric is of the highest grade cotton thoroughly saturated and insulated with live rubber by the Goodrich process.

Federal Adds 3-3½ Tonner

DETROIT, Oct. 1—Federal Motor Truck Co. announces the addition of a new 3 to 3½-ton model to its line. This new unit is powered with the recently developed Continental 20R valve-in-head engine. Other chassis units include a Brown-Lipe seven-speed transmission, an overspeed single-plate clutch, worm-drive rear axle, Westinghouse booster for the rear wheel brakes and propeller shaft emergency brake. The engine, developing 84 hp. at governed speed of 2200 r.p.m., provides a road speed of 42 m.p.h.

Aeronautic Division Formed in New York

Captain Land Named Chairman of New Metropolitan Section Group

NEW YORK, Sept. 29—Aeronautical engineers have been accorded concrete recognition by the Society of Automotive Engineers through the recognition of the aeronautical division of the Metropolitan Section of the S.A.E. This division was formed at the opening meeting this week of the Metropolitan Section for the 1928-29 season, largely attended by aeronautical engineers. Aviation topics were discussed exclusively.

This new division, while operating in connection with the Metropolitan Section, will cover a broader territory than that section and will probably include aeronautical engineers from the Pennsylvania area and from New England. Capt. E. S. Land of the Daniel Guggenheim Fund for the Promotion of Aeronautics was elected division chairman and thus becomes, automatically, a vice-chairman of the Metropolitan Section.

William B. Stout of the airplane division of Ford Motor Co. addressed the members and guests, mentioning a number of the possible developments which will come to the industry during the next few years.

While the airplane industry is much further advanced than most people believe, even automotive engineers suspect it is still in its infancy, Mr. Stout said. Commercial research has just begun and during this year has done more work than had been carried on by government departments for the first time since aviation began. Several definite measures for the further development of aviation were pointed out by Mr. Stout.

Tells of Railroad Activity

Following Mr. Stout, Charles E. McCullough, general passenger agent of the Pennsylvania Railroad, spoke on aviation in connection with railroad traffic and outlined what had already been done in establishing definite rail passenger air routes in this country. He also outlined some of the future plans of the Transcontinental Air Transport.

Lieut. W. M. Fellers of the U. S. Navy spoke on coordination of aircraft and steamship service. In his opinion, the first development of commercial ocean service will be ship-to-shore service. Such has already been developed by a few commercial lines. Following this the next logical step would be a shore-to-ship service, but this will be made possible only by the perfection of the radio compass. Non-stop transcontinental flights will not be made possible, in his opinion, by the refinements of present design and speed but must be sought by the use of lighter models.

Eight-Story Garages Building in London

WASHINGTON, Sept. 29—Two garages on a scale unparalleled in England, modeled after the Grand Central Station in New York, with shops around the main central hall where passengers will be able to purchase anything they wish, are being erected in Gillingham St. near Victoria Station and in Park Road, Regents Park, London, the Department of Commerce is informed by its London office. Each garage is to be eight stories in height and will accommodate 1000 automobiles. Claude Graham White, aviator and motorist, is responsible for the scheme and similar garages are contemplated for various sections of London to accommodate the growing fleets of motor coaches operating in long distance road services.

Pennsylvania R.R. Plans Bus and Taxi Operation

WASHINGTON, Sept. 29—Further indication of the auxiliary use of the motor truck to railroad systems was reflected in this city this week when the Pennsylvania Railroad revealed a plan for the development of an organization to operate motor bus and taxicab systems to local hotels, and probably direct to private residences. An attorney for the railroad made known the plan during a conference with Earl V. Fisher, executive secretary of the Public Utilities Commission of Washington.

Under the plan, tickets sold in New York, Philadelphia, Baltimore and other points would contain a stub entitling passengers on the Pennsylvania Railroad to transportation from the Union Station in Washington to their homes or hotels in a taxicab or motor bus.

The Public Utilities Commission advised the attorney that a formal public hearing before the commission would be necessary before the service could be authorized or denied.

AC 20 Years in Flint

FLINT, Sept. 29—AC Spark Plug Co. observed the twentieth anniversary of its establishment in Flint on Sept. 23. Starting as a spark plug manufacturer in a part of the Buick Motor Co. plant, the company has expanded under the late Albert Champion, founder and first president, and B. W. DeGuichard, now president and general manager, to a producer of 200,000 spark plugs daily, 12,000 speedometers, and one of the industry's largest producers of air cleaners, gasoline strainers, thermo gages, oil gages, fuel pumps, ammeters, tachometers, and instrument board panels.

Gasoline Maximum Proposed for Racing

International Board Considers Plan to Use New Limitation System

PARIS, Sept. 29—A limited quantity of gasoline was proposed as the basis of all major international races, taking the place of the present 91½-inch piston displacement rule, at a meeting of the International Racing Board, held in Paris the week of Sept. 18. The nations represented at this gathering were: France, Germany, Great Britain, Italy, Switzerland, Belgium, Spain and the United States.

Under the new racing rule, which, it is proposed, shall remain in force for three years, the allowance shall be 26.4 lb. of gasoline and oil per 100 kilometers (62 miles). Straight gas shall be used in 1929, but in 1930 and 1931 other fuels may be allowed if they appear likely to come into general use. The cars should weigh not less than 2200 lb., the minimum width should be 39 in., and they must have an external gas tank and no stream lining.

In view of the radical change it was decided to submit this proposal to the various nations interested and to take a final decision at a meeting to be held Oct. 11. The American delegate to the International Racing Board pointed out that Indianapolis had already decided to continue the 91½-inch piston displacement rule. Italy proposed that its national rules for stock car racing should be adopted internationally, but in view of divergences of opinion, it was merely suggested that the national clubs apply these rules in 1929 and report their experience.

The suggestion of the American Automobile Association delegate that flying starts be admitted in world's records for distances of 50 kilometers and upward was not accepted.

Timken Gets Ford Order

DETROIT, Oct. 1—Rise in Timken-Detroit Axle to around $26 reflects expectation of substantially improved earnings in the last half of the current year. Acquisition of order from Ford Motor of Canada for axles, which will amount to $1,000,000 by close of year, together with continued good volume from other customers, is expected to bring earnings in the last half well above results of the first six months, when profits, after charges, were $716,-410, equal after preferred dividends, to 70 cents a share earned on 834,596 shares, par $10, of common.

Briggs to Reopen Plant

CLEVELAND, Oct. 1—Briggs Mfg. Co. is remodeling its Cleveland plant, which until last May was leased by Jordan Motor Car Co., and plans to manufacture one type of Ford body here and possibly bodies for other customers.

Men of the Industry and What They Are Doing

Burke and Herbig Join Fargo Motors Division

Joseph D. Burke, formerly associated with the Packard Motor Car Co., and with Graham Brothers, and E. T. Herbig, formerly branch manager of the Federal Motor Truck Co. branch in New York, have joined the Fargo Motors Corp., the new commercial car division of the Chrysler Corp.

Fargo Motors Corp. is receiving large numbers of applications for franchises, Mr. Kauffman said, with the result that his entire organization is working night and day to interview the applicants.

Hoffman and Welch Sail

Paul G. Hoffman, vice-president of the Studebaker Corp. of America, has sailed for Paris to attend the international automobile salon, where a special display of Studebaker and Erskine cars will be made. He was accompanied by Howard S. Welch, manager of export sales. The two officials will be joined in Paris by A. G. Rumpf, president of the Motor Dealers Credit Corp., exclusive Studebaker-Erskine finance organization, who is now in Europe.

Barker Transue Chairman

H. O. Barker, New York banker, who has been named chairman of the board of the Murray Corp. of America, also has been named chairman of the board of Transue & Williams Steel Forging Co. and chairman of its executive committee. J. R. Gorman has been elected vice-president of Transue & Williams.

Potter Joins Fandango

Leo Potter, who, for the past seven years, has been connected with the radio industry, has become vice-president of Fandango Products Co. of New York, manufacturer of seat covers. Under Mr. Potter's management jobber outlets, and consequently dealer outlets, will receive the greatest attention.

Calfee to Visit Shows

R. M. Calfee, chairman of the board of Peerless Motor Car Corp., has sailed for Paris to attend the show. Walter Zimmerman, Peerless export manager, is already overseas, where he will remain until after the shows are over.

Kirkland Joins Trico

Henry Kirkland, who has been directing the Save-A-Life campaigns under the Automotive Equipment Association, has been made merchandising director of the Trico Products Corp., Buffalo, N. Y. He will devote his entire time to sales promotional activities on the Trico line, specializing on the Visionall windshield wiper.

Wear Heads Stow Company

D. Walker Wear has been elected president of the Stow Mfg. Co., Inc., Binghamton, N. Y.

Rails Call Chrysler, Now Erie Director

Walter P. Chrysler has been elected a director of the Erie Railroad Co., thereby resuming an active interest in railroading which he terminated on resigning as general manager of the American Locomotive Co. to become connected with Buick Motor Co. Starting as a mechanic's apprentice in the Union Pacific shops at Ellis, Kan., Mr. Chrysler worked his way through the railroad mechanical service to his American Locomotive position.

Procter and Allen Change

R. W. Procter of Black & Decker Mfg. Co. has been placed in charge of all sales promotion for that company in both the automotive and industrial fields, and W. C. Allen, who heretofore has been in charge of sales management in the industrial field, will manage sales in both industrial and automotive.

Lydy on Visit Here

R. A. Lydy, of London, England, managing director of the Champion Spark Plug Co. of England and also head of the Bougie Champion Co., which distributes Champion spark plugs in Europe, has been spending several weeks at the Champion factory at Toledo. Mr. Lydy was accompanied to this country by L. Marocchi, technical engineer.

Glentworth Goes Abroad

C. A. Glentworth, export manager of Jordan Motor Car Co., Inc., has gone to Europe to attend the shows where the company is showing a full line of six and eight-cylinder cars. He will hold a series of meetings for European distributors and dealers and will be back at his desk in Cleveland about Nov. 1.

Ayres Resigns From Fisk

F. H. Ayers has retired as vice-president of the Fisk Tire Co., Inc., after 25 years of service. For the present he plans to rest during the present winter, probably in California, and will defer decision as to future activity until spring.

Wallace Heads Moon Zone

W. G. Wallace, formerly vice-president of the Manhattan Moon Co., New York, and later an official at the factory in St. Louis, has been assigned to the eastern Pennsylvania territory as district manager.

Diman Succeeds Kelly as Paris Club President

By reason of its broadening scope, the Automotive Club of Paris changed its title, at the annual meeting held here this week, to American Automotive Club of Europe. Membership now numbers 60.

H. H. Kelly, automotive trade commissioner to Europe, who has been president since the inauguration of the club, resigned his functions, owing to his return to the states to join Hudson Motor Car Co. Charles J. Jerosch also resigned as first vice-president by reason of his return to Akron. The new officers elected were Sidney H. Diman, Graham-Paige Motors Corp., president; Blake Ozias, Dura Co., first vice-president; W. F. Bradley, Chilton Class Journal Co., second vice-president.

The annual salon dinner of the Automotive Club of Europe, which is recognized as the most important gathering of American automotive executives outside the United States, will be held at the Georges V Hotel, Oct. 9, with John N. Willys as toastmaster. Among the guests of honor are Alvan Macaulay, president, National Automobile Chamber of Commerce; Robert C. Graham, vice-president, Graham-Paige; Alfred P. Sloan, Jr., president, General Motors Corp.; J. D. Mooney, president, General Motors Export Co.; Ernest N. Smith, general manager, American Automobile Association; George F. Bauer, foreign trade secretary, N.A.C.C.; H. H. Franklin, president, H. H. Franklin Mfg. Co.; Charles W. Nash; J. B. Hutchinson, vice-president, Chrysler Corp.; W. C. Durant, president, Durant Motors, Inc.; J. S. Draper, export manager, Hudson Motor Car Co.; Paul G. Hoffman, vice-president, Studebaker Corp.; Harry Tipper, General Motors Export Co., and James L. Gilbert, vice-president, Business Publishers International Corp.

Lester Heads Division

Bernard Lester, assistant industrial sales manager of the Westinghouse Electric & Mfg. Co., has been placed in charge of the company's business relationships with architects, builders, building contractors, and manufacturers of machinery and motor-driven appliances with headquarters at 150 Broadway, New York.

Willems Sails for Europe

E. G. Willems, export counsel for the Franklin Automobile Co., has sailed for an extended trip through Europe. Mr. Willems will be engaged on a program of export expansion for the continent and will attend both the London and Paris shows, where he will be joined by E. S. Marks, chief engineer of the Franklin company, and Lloyd B. Benham, export manager.

Avery Takes Over Murray Presidency

Operating Policies to Continue as Formerly—Sees Continued Good Business

DETROIT, Oct. 1—The new management of the Murray Corp. of America will continue the company's program of constantly improving efficiency within the plants, Clarence W. Avery, who was elected president and general manager at the meeting in New York, Wednesday, said on his arrival in Detroit to take up his new duties.

A program of expansion which is being brought about by the rearrangement of departments within the present Murray buildings will be continued, Mr. Avery said. Besides personnel changes announced after the New York meeting, there will be few other changes, he said.

Asked if rumors which have been current in financial circles to the effect that a certain automobile manufacturer was trying to gain control of one of the large body companies, Mr. Avery said for Murray: "You can say for me that no motor car manufacturer whatsoever is interested in the change of management which was announced in New York." Of business outlook, he said:

"Everything points to an exceptionally good business for the automotive industry during the last quarter as compared with previous corresponding periods. Naturally the Murray corporation should enjoy a very satisfactory volume."

The new president of the Murray Corporation has been associated with the company for a year as assistant to the president. Previous to that he was with Ford Motor Co. 15 years.

In 1912 Mr. Avery left the faculty of the Detroit University School to join the Ford organization as a shop student. By successive promotions he became assistant general superintendent of the Highland Park plant and later chief development engineer. When he joined the Murray organization Oct. 1, 1927. Mr. Avery took charge of manufacturing, purchasing and engineering. Now that he has been elevated to the presidency he announces that manufacturing will all be under A. P. Dowell, who has been elected vice-president in charge of manufacturing. Sales activities will be in charge of Charles Widman, who has been elected vice-president in charge of sales.

Complete Overland Plant

LOS ANGELES, Oct. 3—The new Willys-Overland factory buildings here were expected to be completed early this month and ready to receive their machinery. The big plant is expected to begin operations by Nov. 1. The factory is located adjoining the central manufacturing district and will represent an investment of $1,500,000.

C. W. Avery

New president of Murray Corp. of America, succeeding William Robert Wilson

Ford Motor Builds 2 Bus Body Types

DETROIT, Oct. 3—Bus bodies made by the Ford Motor Co. will soon be available for the Ford Model A chassis and the Ford 1½-ton truck chassis. The smaller body accommodates nine passengers in addition to the driver and the larger unit 14 passengers and the driver. Bodies are of steel with rubber-coated fabric material covering the roofs. Seats run lengthwise on each side of the body and they may be folded out of the way so that the body can be used for carrying merchandise. Driver and one passenger are accommodated on folding seats. A rear door, which operates a folding step, gives access to the body. The spare tire is carried in the front fender.

Inside height of both bodies is approximately 51 in., and width 50 in. Length back of the driver's seat in the larger body is 93 in., the side seats being 92 in. long. In the smaller body length of side seats is 62½ in.

Wide sedan-type side windows are used in both bodies. The Model A body has two windows on each side in addition to that in the front door and the Model AA body for the 1½-ton truck chassis has three windows plus the doors.

Prices of the new bodies have not yet been announced.

Equipment Makers to Meet

CHICAGO, Oct. 1—Associated Manufacturers of Fabric Auto Equipment, Inc., will meet Oct. 20 at the La Salle Hotel here. A program of importance to members is being prepared and a dinner will be held at the closing session

Financial Notes

Edward G. Budd Mfg. Co. will issue 98,224 additional shares of common stock. Stockholders of record Oct. 5 will have right to subscribe for the new stock at $21 a share at the rate of two shares of new stock for each five shares of stock now held. Arrangements have been made for underwriting the entire issue. Profits of the company for the first eight months of the year total $1,123,209. Proceeds from the sale of stock will be used for increased working capital made necessary by larger volume of business. Large increases in operation will be required by new schedules from customers.

Fisk Rubber Co. directors have voted to omit the quarterly dividend of $1.75 on the 7 per cent preferred, 7 per cent convertible first preferred and 7 per cent second preferred stocks due at this time. It is said this action was taken because of the reduction in surplus resulting from losses sustained by the drop in crude rubber prices in the first six months of the year.

American Smelting & Refining Co. reports net earnings in the first six months of 1928 of $8,219,451, which after preferred dividends was equal to $10.60 a share on common stock. This compares with $8,507,944 in the 1927 first half.

Western Auto Supply Co. reports sales for the eight months ended Aug. 31 as $7,627,000 as against $7,734,000 for the corresponding period in 1927. The company had 47 stores in operation on Aug. 31.

H. H. Franklin Mfg. Co. has declared quarterly preferred dividend of $1.75 payable No. 1 to holders of record Oct. 20, and a 50-cent dividend payable Oct. 20 to holders of record Oct. 10.

Glidden Co. reports net profit for the 10 months ended Aug. 31 of $1,550,965, as compared with $1,103,763 for the corresponding period last year.

Fafnir Bearing Co. has declared regular quarterly dividend of 50 cents and an extra dividend of 50 cents, both payable Oct. 1.

Hardwood Mills Foresee Normal Late Year Sales

ATLANTA, Oct. 3—Though the automobile and body manufacturing industries are still the leading buyers of Southern hardwoods in many of the lumber markets of the Southeast, this business has recently been showing a tendency to decline and orders are not as heavy as they were a month ago.

The late year outlook is for about a normal volume of business, and judging from the present tone and volume of inquiries it is likely that quite a few advance orders will be placed by some of the larger plants. Sales of body lumber in the Southeast are particularly heavy at this time, and about normal in the East and slightly better than normal in the Middle West. To automobile factories sales are relatively on a normal basis.

Retail Sales Decline in September

(*Continued from page 496*)

weather sharply curtailed marketing opportunities. Business for the month, however, was considerably better than in the same month last year and new car stocks are low.

Reports from leading cities follow:

Boston

September business was good for the first 10 days. Since that time it has been appreciably slower. That holds good for high and low priced cars as an average. There are some dealers who could have done much better if they could have got the cars buyers wanted. One reason why new car sales have slipped is that many dealers in the metropolitan territory are now forcing the sale of used cars, and they have put the lid on trades as they wish to cut the inventory down to reasonable figures with the winter looming up.

New York

Following eight months of almost record trading, automobile sales in this territory have struck the seasonal fall decline in more than a usual degree. Although one or two lines are unable to meet deliveries on recently introduced models, buying as a general rule has fallen off considerably during the last two weeks. As a result of this used car allowances are rising, although there have been attempts on the part of at least two distributors to reduce allowances. Sales for the first week in September, the only figures available as yet, amounted to 2837 vehicles as compared with 1158 for the corresponding period last year.

Detroit

Cold weather during the past two weeks of September has tended to slow up car sales in Michigan though reports indicate that deliveries are keeping ahead of the rate maintained a year ago. Employment continues at a high rate in the state's various industrial centers and this will no doubt insure a greater demand than during the last quarter last year. Used car stocks are heavy and many dealers are putting forth special effort to reduce them. There is a good demand for used vehicles, especially of the cheaper types.

Cleveland

Automotive sales are somewhat ahead of the record in 1927, despite a sharp decline in September. Lower stocks of used cars are reported, according to Herbert Buckman of the Automobile Manufacturers & Dealers Association. It is anticipated by dealers that the next three months' business will be considerably better than in the last three months of 1927.

Louisville

Automotive business through Kentucky and Tennessee continues active, with indications of excellent late fall business. Distributors report that while there was a decline in August, September has picked up. In Louisville every month of the year has shown a gain in new car sales over 1927. August showed a gain of 54.7 per cent. For the year new car sales up to Sept. 1 showed 6680 delivcries in Jefferson county, as against 5121 for the same period of last year. Distributors report that outlook is rather encouraging in the agricultural districts. In western Kentucky's new oil fields business is booming.

Atlanta

Dealers say there has been little change in automobile conditions the past month, September sales are larger than the same month last year. Lower-priced cars are selling unusually well and medium-priced good, and higher-priced fair. Dealers look for some decline in sales this fall but do not believe there will be as big a fall decline as in the last two or three years. Truck sales also gained over last year and to date are at least 20 per cent better than up to this period in 1927.

Cincinnati

Sales during the last quarter will show a decided increase over last year and bring the total for 1928 well over 1927, despite the bad spring. The surprising demand in August was followed in September by an almost equally heavy registration. Used cars are not keeping pace with new car sales, though a 6 per cent increase in used car sales is reported for the first 20 days in September over the same period a year ago and stocks are declared to be lower than ever before. New car stocks are very low and deliveries are being delayed from one to three weeks on the more popular models.

Chicago

Retail sales of automobiles continued in September the record pace set in July and August. Dealers' stocks are low and used car stocks are unusually scant considering the period of the year. Special efforts on the part of dealers to move used cars are considered one of the principal reasons for these conditions. A record fourth quarter seems assured in the Chicago retail trade, all dealers reporting bright prospects.

St. Louis

Retail dealers did a snappy business during the month. Used cars also sold well and stocks of new cars were reduced considerably. The brisk September business has led dealers to anticipate a continuation of the buying tendency at least until the middle of December.

Milwaukee

The passenger car trade looks for an active demand during the remaining months of the year, and the outlook is considered more promising than last year. At the close of September, most distributors were still behind on deliveries to dealers, while dealers reported more unfilled orders than customary. At the beginning of October, Ford dealers in this locality were just commencing to make deliveries against orders taken in the early part of January. General business conditions here are considered very favorable.

Kansas City

There has been a slight recession in automobile sales in September, compared with August or July, but still are better than last year. The falling off is reported by dealers whose lines are without new models in the last few months. Dealers with new models are reporting good sales, some breaking records. The average would not be more than 10 per cent under August. In the face of the falling off, all dealers are predicting record sales in the last quarter of the year.

Minneapolis

The automobile business is on the gain. Business is an average of 20 per cent better than a year ago. More cars are being bought for cash and the used car situation is on a sound basis. Prospects are good for a fall and winter sale of cars. The stocking up of cars by dealers seems to be a thing of the past.

Dallas

With a $500,000,000 cotton crop being marketed in Texas during September, October and November, and the financial situation is better than it has been for some time, automobile dealers and jobbers are not anticipating any great decline in business during the final quarter of the year other than the usual hesitation attendant upon approach of the new models. Retail stocks are normal. New car sales for September were as good as for August and as for September a year ago. More Fords are being delivered. Medium-priced cars are selling well. Used car stocks are rather heavy and the prices low. Truck sales show an increase in the rural districts.

Denver

September showed a variation in business among dealers in various makes. Ford demands are far ahead of production and dealers are talking deliveries in from six to eight months. Consequently other light cars report unusually good sales, but light trucks have not had their usual fall demand, owing to bad farm conditions. With few exceptions September business has been poor, both in Denver and in the state. This condition is particularly noticeable in the irrigated regions.

Seattle

Car sales for September were about even with August and 10 per cent ahead of sales for September, 1927. Sales for the first nine months, however, will be approximately 14 per cent off for the same period of 1927. Stocks are not very heavy at the present time. Requirements of the various dealers will be heavy for the next three months, to take care of orders booked ahead. The used car market has slowed.

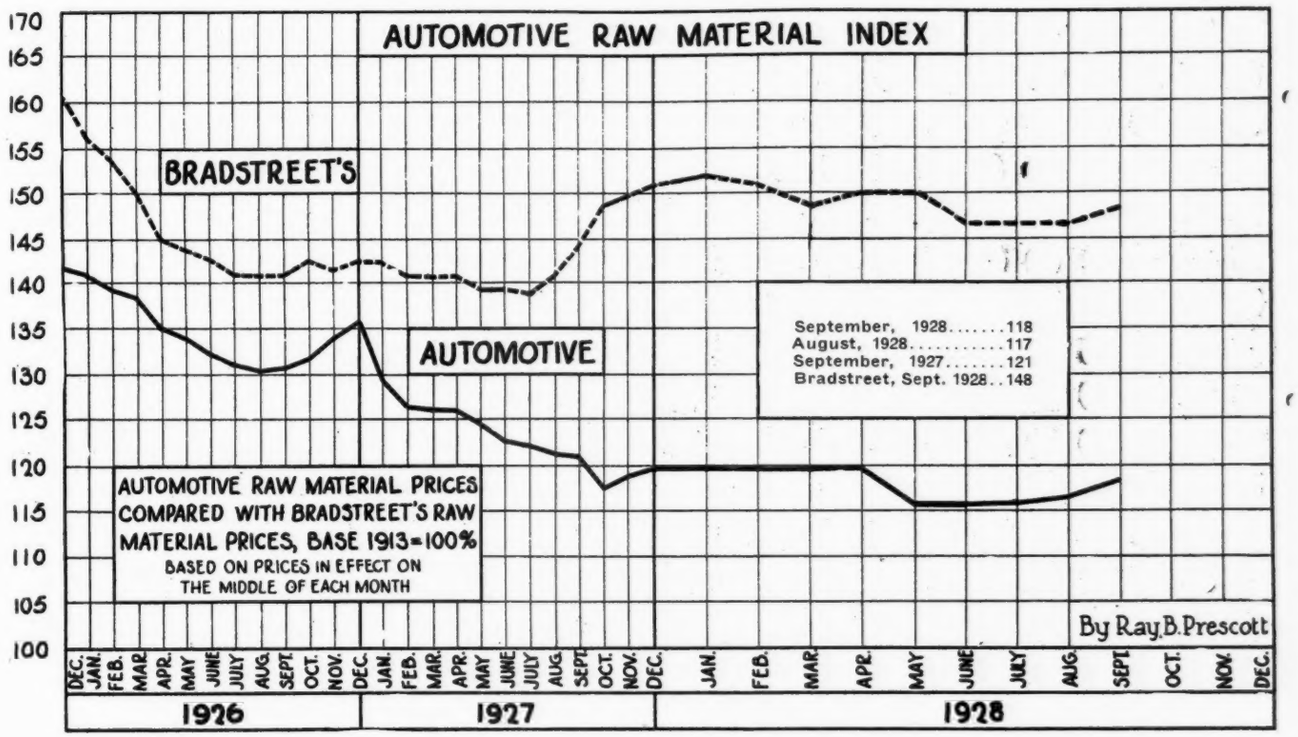
San Francisco

California's sales of all classes of automobiles for August were the heaviest of any month in the last year. In view of this situation and the continued volume of trade, dealers in this section believe the usual decline that comes in the last two or three months of each year will not materialize this year. There is heavy activity in all lines and many dealers are not able to fill their orders at once.

Los Angeles

Southern California sales held up well in September, although total may go slightly under same month last year. There is a good demand for used cars and distributors expect reasonably good business during the remaining months of the year. The truck market is improving.

Raw Material Index Rises One Point



Twin City Ford Manager Dies on Vacation Trip

MINNEAPOLIS, Sept. 29—Stephen A. Stellwagen, for six years manager of the Twin City Ford Motor Co. branch, died Saturday while on his vacation at Isle Royale, Lake Superior. Word was not received by relatives here until today. With a guide he had been taking motion pictures of wild animals and while packing for his return to the hotel died suddenly. Mr. Stellwagen was 50. He entered Ford service in 1915 and held many important offices in the field.

He was assistant manager at the Indianapolis branch and of plants at Portland, Ore., and Omaha, Neb. He was transferred to Minneapolis as manager for the Northwest in 1922. When the St. Paul Twin City plant was completed in 1925 he became executive manager there as well as head of the sales organization. He is survived by his wife, daughter, son, mother, sister and brother.

German Fuel Meets Test

WASHINGTON, Sept. 29—Preliminary reports of the test of a new German invention providing for the use of crude petroleum as a motor fuel, made under the supervision of the Royal Automobile Club of Great Britain, indicates a satisfactory performance of the truck with crude oil used as fuel, according to advices to the Department of Commerce from its London office. The first of a series of tests was made with the engine burning crude oil over a distance of about 50 miles, the total load including truck and trailer weighing about 20 tons and the speed averaging eight miles an hour.

Canada Exports Aggregate One-Third of Production

DETROIT, Sept. 29—During August Canada produced 31,245 cars, valued at $18,705,651. This was 24 per cent over the output for July and was exceeded in only one previous month, May, 1928, when 33,942 cars were produced. Of the total production in August, 19,941 cars worth $13,934,534 were intended for sale in Canada and 11,304 vehicles valued at $4,771,117 were made for export.

For the eight months ended Aug. 31, 1928, the cumulative production of automobiles in Canada was 181,459 cars having a sales value of $116,209,341 as compared with 150,321 cars valued at $96,757,055 made during the corresponding period of 1927.

Of the total cars made during the year to date, 129,658 were intended for sale in Canada and the balance of 51,801 were for export.

Argentine Imports Gain

WASHINGTON, Sept. 29—The automotive demand is growing as the spring season in Argentina approaches, the Department of Commerce is informed. August automotive imports were as follows at Buenos Aires; 4758 American passenger cars, 293 European; 1685 American trucks, 26 European; 7 American motorcycles, 1 European.

Chevrolet Builds Units to Meet Parts Demand

DETROIT, Sept. 29—The parts and service division of Chevrolet Motor Co., since the first of the year, has been carrying on a building program which has added to the company's numerous plants five zone warehouses, now in use, and calls for construction of three more before Jan. 1. In addition, major supply depots in Atlanta and Kansas City have been built and put into operation this year.

Los Angeles, Houston, Omaha, Philadelphia and Cleveland are the centers which have seen warehouses already built and opened for use. Work is to begin this fall on others in New Orleans, Fargo and Indianapolis. The New Orleans warehouse is scheduled to open in November, the Fargo warehouse in December and the Indianapolis warehouse in January.

Buys Peoria Plant Site

PEORIA, ILL., Sept. 29—The National Airways System, Inc., which is now operating a factory at Lomax, Ill., has secured a 137-acre tract near here for a new factory site and field. The firm makes the Air King plane and is now introducing its new Air King "Mono 4" cabin type plane with four-passenger capacity. S. F. Tannus, president of the company, expects to have the local plant in operation by Jan. 15 with a force of 400 men, producing 15 planes a week, with prospect of increase as production gets under way.

Exports, Imports and Reimports of the Automotive Industry for Month of August of Current Year and Total for Eight Months Ending August, 1928

	Month of August				Eight months ending August			
	1927		1928		1927		1928	
	Number	Value	Number	Value	Number	Value	Number	Value
Automobile parts and accessories	..	$32,632,515	..	$46,897,612	..	$274,928,965	..	$340,260,716
Electric trucks and passenger cars	11	19,800	4	11,881	80	151,709	85	112,507
Motor trucks and buses, except elec. (total)	8,766	5,857,977	16,192	10,119,060	72,720	46,588,143	87,925	59,096,486
Up to 1 ton, inclusive	7,264	3,441,217	11,831	5,628,732	60,317	27,971,001	66,365	33,718,097
Over 1 and up to 2½ tons	1,275	1,734,934	4,053	3,771,111	10,737	13,709,729	19,409	20,125,169
Over 2½ tons	227	681,826	308	719,217	1,666	4,907,413	2,151	5,253,220
PASSENGER CARS								
Passenger cars, except electric (total)	23,295	16,868,851	32,015	22,558,806	202,474	147,898,349	265,254	186,476,761
Value up to $500, inclusive	4,133	1,483,395	..	..	48,520	17,949,460	..	..
Value over $500 up to $800	7,759	3,727,500	..	..	69,436	38,826,632	..	..
Value over $800 up to $1,200	7,748	6,433,329	..	..	56,516	48,925,811	..	..
Value over $1,200 up to $2,000	2,994	3,754,332	..	..	21,866	27,414,170	..	..
Value over $2,000	661	1,470,295	..	..	6,136	14,782,276	..	..
PARTS, ETC.								
Parts, except engines and tires	..	2,996,553	..	6,863,422	..	32,228,300	..	42,220,845
Automobile unit assemblies	..	5,427,391	..	5,276,004	..	33,584,238	..	35,441,834
Automobile parts for replacement	..	620,692	..	822,537	..	5,670,153	..	6,319,622
Automobile accessories	..	696,689	..	521,591	..	5,643,143	..	4,925,137
Automobile service appliances (n. e. s.)	12	13,860	107	33,698	196	138,336	186	150,575
Station and warehouse motor trucks	135	67,340	56	38,619	635	290,926	481	203,512
Trailers	7	60,273	14	135,477	27	383,417	117	1,307,936
Airplanes, seaplanes and other aircraft	..	117,598	..	108,721	..	337,749	..	879,365
Parts of airplanes, except engines and tires								
BICYCLES, ETC.								
Bicycles	378	9,324	300	8,565	3,236	89,030	3,297	89,003
Motorcycles	1,477	334,716	1,998	479,931	13,242	2,960,341	13,665	3,184,062
Parts, except tires	..	90,703	..	155,482	..	866,737	..	1,018,171
INTERNAL COMBUSTION ENGINES Stationary and Portable								
Diesel and Semi-Diesel	27	38,905	85	156,709	520	869,997	418	770,831
Other stationary and portable:								
Not over 10 Hp.	2,885	251,974	3,494	283,707	18,785	1,688,171	25,114	2,172,582
Over 10 Hp.	612	191,353	651	253,164	1,697	1,181,076	3,266	1,315,783
Automobile engines for:								
Motor trucks and buses	325	39,798	3,534	278,974	4,089	485,408	12,864	1,221,065
Passenger cars	5,896	801,453	10,261	966,928	77,653	8,322,665	90,993	9,371,596
Tractors	63	14,916	41	20,275	933	398,120	353	114,421
Aircraft	5	16,530	34	114,355	47	288,989	117	416,384
Accessories and parts (carburetors)	..	185,735	..	272,140	..	2,454,735	..	2,525,105
IMPORTS								
Automobiles and chassis (dutiable)	49	61,611	52	76,022	384	692,597	330	704,082
Other vehicles and parts for them (dutiable)	..	19,170	..	63,650	..	141,797	..	431,501
REIMPORTS								
Automobiles (free from duty)	18	22,552	20	30,572	133	198,171	167	193,208

Tiers is Named President of Motor Truck Equipment

BUFFALO, Sept. 29—C. F. Tiers of the Schnable Co., Pittsburgh, was elected president of Equipment for Motor Trucks, Inc., at the fourth annual meeting held here last week. Other officers are V. L. Farnsworth, Hydraulic Hoist Mfg. Co., St. Paul, first vice-president; J. H. Press, Jacob Press' Sons, Chicago, second vice-president; G. M. Bunn, Philadelphia, secretary, and E. R. Boeck, Truck Equipment Co., Inc., Buffalo, treasurer.

Directors are W. R. Couch, Interboro Hoist & Body Corp., Long Island City; M. Devney, Perin Walsh Co., Boston; H. Cohen, Perfection Steel Body Co., Galion, Ohio; M. T. Gardner, Ohio Truck Body & Wagon Co., Cleveland, and William Morrison, Highland Body Mfg. Co., Cincinnati.

The association is organized to promote the interests of motor truck equipment manufacturers and their distributors.

Willys Introduces Bus

TOLEDO, Oct. 4 — Willys-Knight products are to be extended to include a bus chassis which, for the present at least, will be manufactured for export only and handled entirely through the Willys-Knight Export Corp. A sample chassis was exhibited for the first time last week at the convention of the American Electric Railway Association, in Cleveland. The engine is a 3⅜ in. by 4¾ in. Knight sleeve-valve type with a seven-bearing crankshaft and developing 70 hp. at 2600 r.p.m. Wheelbase is 190 in. with an overall chassis length of 276½ in. Budd-Michelin disk-type wheels are used with 32 by 6.75 tires, dual rear.

Borg-Warner Earnings $3,085,844 in 8 Months

CHICAGO, Oct. 1—Net earnings of the Borg-Warner Corp. for the eight months ended Aug. 31, 1928, were greater than those of the four companies for which Borg-Warner is the holding corporation for the entire year 1927, according to an official statement.

For the first eight months of this year net income was $3,085,844 after all charges, equal after preferred dividends amounting to $53,083, to $7.39 a share on 410,000 shares of $10 par common stock. In the year ended Dec. 31, 1927, the consolidated net income of the four companies which make up the Borg-Warner organization amounted to $3,055,402, which based on the present capitalization is equal after allowing for a full year's dividend requirements to $6.85 a share on the common. The corporation reports cash on hand of $3,400,000, as compared with $2,179,851 on Dec. 31, 1927.

Studebaker Truck Sales Gain 67%

SOUTH BEND, Sept. 29—Deliveries of Studebaker commercial cars during the first eight months of this year showed a 67 per cent increase over deliveries made during the corresponding period of 1927, according to Charles H. Wondries, manager of the commercial car division of the Studebaker Corp. of America.

Crude Rubber Exports 26,170 Tons in August

NEW YORK, Oct. 1—Exports of crude rubber from the restricted areas of Malaya showed a marked increase during August due, in the opinion of F. R. Henderson Corp., to the fact that August was the first month of the last quarter of restriction and plantations were naturally anxious to ship as much rubber as possible before the removal of restriction.

Exportation during that month amounted to 26,170 tons as compared with 19,241 tons in July and with 12,935 tons in June. Arrivals at all ports of the United States during September, this company estimates at 45,200 tons. Gross shipments from the Dutch East Indies during August amounted to 25,305 tons as compared with 24,986 tons in July and 25,305 tons in June.

Auburn Offers Victoria

AUBURN, IND., Oct. 1—A new four-passenger Victoria model on the 8-88 and the 6-76 chassis is announced by Auburn Automobile Co. Production has begun and shipments are being made daily. The new model incorporates the standard Auburn lines with only slight changes in general design.

One deviation from former Auburn design is in the windshield which raises up instead of out as on the present sedans and sport sedans. The windshield wiper operates from the top of the windshield.

Location of the gearshift lever has been changed to place it in a position most easily reached by the driver.

Steel Mills Seek Price Entrenchment

Pronounced Resistance Seen to Efforts for Concessions From Present Scale

NEW YORK, Oct. 6—Steel producers are now striving with might and main to conserve and, if possible, strengthen recent price advances. It is a foregone conclusion that new commitments over the remainder of the year will taper off and the problem that steel producers are endeavoring more earnestly at this time than ever before to solve is the old one of maintaining prices in the face of declining demand.

Producers are more than ever determined to prevent this demoralizing condition from spoiling what has thus far been accomplished in strengthening the market's price structure. There is no question that automotive consumers are facing pronounced resistance on the part of sellers when they seek to obtain the slightest concession in price from the mills.

Steel bar mills are hard at it to establish the fourth quarter market for the hot-rolled product on a 2.00 cents, Pittsburgh, basis. Most of the large buyers are covered on a 1.90 cents or 1.95 cents basis, and the volume of business looked for in the immediate future is relatively light. For this very reason, the mills consider the time opportune for making the 2.00 cents price level fully operative. Fourth quarter business for cold-finished steel bars is being done at 2.20 cents, Pittsburgh. This represents an advance over prices in vogue earlier in the summer, and if the hot-rolled bar market should really be established on a full-fledged 2.00 cents basis, further stiffening of the cold-finished market would naturally follow.

Sheet rollers continue to work at very close to capacity, especially those producing full-finished automobile sheets. Anticipating an early advance in the price for sheet-bars and billets, non-integrated producers of sheets and strip-steel are thought to have taken on as much semi-finished material at old prices as possible, but an advance in sheet-bars and billets would tend to impart further strength to the sheet and strip markets.

Pig Iron—Automotive foundries, accustomed to tonnage buying, are thought to be covered over the remainder of the year. Smaller foundries continue as occasional carload buyers. The Valley market for foundry iron ranges from $16.50 @ $17.00 for No. 2, Lake furnaces quoting $17.50, Cleveland.

Aluminum—The market is devoid of new developments. Prices continue on an even keel. The market for secondary metal is steady.

Copper—For the present the buying movement appears to have come to a halt, with the prices recently established firm. Arizona mines have voluntarily granted their men a 10 per cent wage increase. A fair volume of orders from automotive consumers is enjoyed by the Connecticut brass mills.

Tin—Developments in the tin market have resulted in higher price levels. London cables advised formation of a combine of tin-producing interests in the Malayan Peninsula.

Lead—So far the Australian strike which has tied up shipping, has had little effect on the London market, but if lead shipments from Australia to London should be seriously impaired, world prices would rise, affecting the market here instantly. Prices so far, however, remain unchanged.

Zinc—The market is steady with little change noted.

Hupp Export Chief Ends 10 Months' Trip; Says War Debts Hinder Road Building Abroad

DETROIT, Oct. 2—Conditions are generally improving in Europe and the American automobile industry is now well established in all its markets, according to Fred B. Sides, export manager of Hupp Motor Car Corp. Mr. Sides' views are based on personal observation during an extensive foreign trip which in the past 10 months has taken him to Europe, Australia and Africa.

"Climatic conditions, which are important factors in the prosperity of many of the countries I visited, had generally been very unfavorable until within the last few months, but they have changed distinctly for the better," said Mr. Sides after his return to Detroit.

"South Africa is largely dependent on the amount of rain, and when I was there they had been suffering from prolonged droughts. Recently good rains have come and the bearing of weather conditions on the volume of their trade is indicated by the increased number of orders they are sending for American goods.

"In Australia the general opinion of business men I met was that by late fall the worst of the depression they were experiencing would be over, while in New Zealand they were already around the corner and exports were showing a favorable trade balance over imports.

"Future prospects for foreign business are generally excelled. While we probably will not have the rapid increases we have had sometimes in the past it is safe to forecast a steady increase in the number of cars shipped, and in the long run the business will be all the better without the high-peak and deep-valley curves of former export trade charts.

"One factor that is making for increased demand for automobiles abroad is the growing attention being paid to good roads. In every country I visited I found a genuine appreciation of the need for highway improvement, but financial difficulties have stood in the way of their full realization. Most foreign countries are still suffering from the effects of the World War and their revenues are tied up by a multitude of other needs. While there is not yet any too much in the way of good roads outside some of the cities, the movement in their behalf is steadily making progress and it is particularly noticeable that whatever is done is planned with a view to permanency.

Japan Registrations Grow

WASHINGTON, Sept. 29—The rapid motorization of Japan is reflected in registration figures for 1927 showing a total of 54,632 vehicles—34,754 passenger cars and 19,878 trucks and buses—the Department of Commerce is advised by its office at Tokio. This represents approximately a 28 per cent increase over 1926. The United States supplied approximately 81 per cent of a total of 3895 fully assembled passenger cars and trucks imported into Japan in 1927.

Opens Pittsburgh Office

NEW YORK, Oct. 2—Vanadium Corp. of America has opened an office at 2245-2246 Henry W. Oliver Bldg., Pittsburgh, under the direction of J. Alfred Miller, Jr., general manager of sales of the Vanadium Corporation.

Budd Manufacturing Upheld in Wheel Patent Claim

PHILADELPHIA, Sept. 29—The Supreme Court of Pennsylvania, after seven years' litigation, has dismissed the case of C. H. Machen, of Ardmore, Pa., and reversed the two findings of a lower court which had granted Mr. Machen verdicts of $250,000 and $450,000 against the Budd Wheel Co. of Philadelphia and Detroit. Mr. Machen had claimed the invention of a process for rolling automobile steel disk wheels.

Mr. Machen, employed in 1918 by the Budd company as a salesman, claimed invention of a process to taper steel wheels to proper proportions, and that Edward G. Budd, president, promised a life job and salary rises in proportion to the invention's use. The case was first brought in United States District Court, January, 1921, and the plaintiff's case dismissed on grounds that no enforcible contract existed. In January, 1924, Judge Dickinson upheld his original decision.

Stinson Increases Stock

LANSING, MICH., Sept. 29—The Michigan Securities Commission has approved the amendment of the articles of the Stinson Aircraft Corp. of Detroit and sale of 23,500 shares of additional stock at $10.50 a share. Under the change in the articles all of the outstanding stock is to be called in and replaced by 100,405 new shares of no-par stock.

G.M. Style Exhibit Set for Oct. 13-20

DETROIT, Oct. 2—General Motors Corp. will hold its annual fall style show in the General Motors Building, Oct. 13 to 20. The entire ground floor will be utilized for the display besides all the showrooms of the various passenger car divisions of the corporation. The two rooms at either side of the auditorium will be devoted to a display of trucks while in the auditorium besides motor cars, six new Frigidaire models will be shown.

Elaborate decorations are being worked out by George Wittbold of Chicago. The decorative scheme will be carried out both inside and outside the building and will form the setting for the 83 motor cars which will be on display. A special feature will be music afternoon and evenings by George Olson and his 20-piece orchestra.

Driggs Tests Plane Engines

LANSING, Sept. 29—A four-cylinder, 60 hp. aircraft engine designed by H. E. Moorehouse of the Michigan Screw Co., is being tested by the Driggs Aircraft Corp. For the present the engine is being tested in an Avro-Avion airplane and the company plans to build a larger ship supplementing its line of Driggs-Dart airplanes which would utilize an engine of the Moorehouse size. The company is also testing an engine built by Velie Motor Co., which may be substituted for the Anzani engines now being shipped from Paris.

Rockford Seeks Plane Plant

ROCKFORD, Sept. 29—A syndicate of local men is negotiating to bring the U. S. Airplane Co. of Chicago to this city and if the proposal goes through the plant will be located in the Sutton Tower with assembly plant at the Rockford Airport. The plane is being sold for $3,200.

Coming Feature Issues of Chilton Class Journal Publications

Oct. 10—Marketing Annual for 1929—Motor World Wholesale.

Nov. 17—Production and Factory Equipment Issue—Automotive Industries.

Gasoline More Standard, Bureau of Mines Finds

WASHINGTON, Sept. 29—A tendency toward standardization in volatility of gasoline sold in summer and winter is noted by the Bureau of Mines of the Department of Commerce, according to a public announcement of the department. Gasoline marketed in the United States during the past summer was more volatile than gasoline sold during the summer of 1927 but less volatile than the gasoline marketed in January, 1928. Variations in the volatility, however, are tending to diminish with a tendency toward a standardized product, the bureau finds.

Sales Gain in Southern California

LOS ANGELES, Oct. 1—August passenger car sales in southern California (14 counties) were the record for that month in three years, with a total of 12,096. Chevrolet led the list of sales with 2419 and Ford came next with 2060. Sales exceeded those of August, 1927, by 3331 cars.

Bauer Congress President

NEW YORK, Sept. 29—Word has been received here of the election of George F. Bauer, secretary of the foreign trade committee of the National Automobile Chamber of Commerce, as one of the four presidents of the Fifth World Motor Transport Congress now meeting in Rome, Italy.

Michigan Registers 18,565 Cars in August

DETROIT, Sept. 29—A total of 18,565 new passenger cars were titled in Michigan in August compared with 11,405 in the corresponding month of last year. August deliveries bring registrations for the first eight months to 143,708. Chevrolet delivered 3062 cars in August compared with 3876 in the corresponding month last year. Ford was a close second, delivering 2934 units compared with 131 a year ago.

Truck registrations for the state totaled 1128 in August compared with 683 in corresponding month of last year. Truck registrations for the first eight months totaled 10,019 units of which 4128 were Chevrolet, 2226 Ford, 881 Graham Brothers, 660 Reo, 583 GMC, 456 International and 286 Yellow. Balance of the registrations were distributed among other truck makers.

See 65,000 Sales in N. C.

RALEIGH, N. C., Sept. 29—New car sales totaling 7210 were made in North Carolina in August, as compared with 6950 in July, according to tabulations just announced by Sprague Silver, director of the North Carolina automobile license bureau. He said "North Carolina should go this year well above its best previous record, if the volume of sales for the first eight months is maintained." He estimated that the total may mount to approximately 65,000 new cars for the year.

Grosvenor Heads Fairchild

NEW YORK, Sept. 29—Graham G. Grosvenor, formerly vice-president of the Otis Elevator Co., has been made president of the Fairchild Airplane Co., manufacturing subsidiary of the Fairchild Aviation Corp. Mr. Grosvenor is also director and vice-president of the parent company. Russell Kincaid, formerly vice-president of the airplane company in charge of production, has resigned.

Calendar of Coming Events

SHOWS

Aeronautical Exposition, Coliseum, Chicago .....Dec. 1-9
American Road Builders Association, Inc., Cleveland Auditorium..Jan. 14-18
American Society for Steel Treating, Commercial Museum, Philadelphia .....Oct. 8-12
American Welding Society, Commercial Museum, Philadelphia .....Oct. 8-12
Automotive Equipment Association, Coliseum, Chicago .....Oct. 22-27
Berlin .....Nov. 8-18
Boston, Mass., Mechanics Bldg...March 2-9
Brussels .....Dec. 8-19
Buenos Aires .....Nov. 29-Dec. 9
*Chicago, National, Coliseum, Jan. 26-Feb. 2
International Aviation Exposition, Berlin .....Oct. 8-28
London, passenger cars .....Oct. 11-20
Montevideo .....Nov. 10-19
National Standard Parts Association, Cleveland Auditorium...Oct. 29-Nov. 3
*New York, National, Grand Central Palace .....Jan. 5-12
Paris, trucks .....Nov. 15-25
Salon, Automobile Salon, Inc., Hotel Drake, Chicago .....Jan. 26-Feb. 2
Salon, Automobile Salon, Inc., Hotel Biltmore, Los Angeles .....Feb. 9-16
Salon, Los Angeles Motor Car Dealers Association, Biltmore Hotel..Oct. 17-20
Salon, Automobile Salon, Inc., Hotel Commodore, New York .....Dec. 2-8
Salon, Automobile Salon, Inc., Palace Hotel, San Francisco...Feb. 23-Mar. 2
Western States Metal and Machinery Exposition, Los Angeles.....Jan. 14-18

*** Will have special shop equipment exhibit.**

CONVENTIONS

American Gear Manufacturers Ass'n, Statler Hotel, Buffalo, N. Y...Oct. 11-13
American Institute of Mining and Metallurgical Engineering, Metals Division, Benjamin Franklin, Philadelphia .....Oct. 8-12
American Road Builders Ass'n, Inc., Cleveland Auditorium .....Jan. 14-18
American Society for Steel Treating, Commercial Museum, Philadelphia .....Oct. 8-12
American Society for Steel Treating, Semi-Annual Meeting, Los Angeles .....Jan. 14-18
American Welding Society, Commercial Museum, Philadelphia .....Oct. 8-12
Automotive Equipment Association, Coliseum, Chicago .....Oct. 22-27
International Air Conference, Washington ... .Dec. 12-14
Mid-West Motor Truck Transportation Congress, Indianapolis..Oct. 23-26
National Metal Congress, Los Angeles .....Jan. 14-18
National Research Council, Washington .....Dec. 13-14
National Standard Parts Association, Hollenden Hotel, Cleveland, Oct. 29-Nov. 3
Society of Industrial Engineers, Rochester, N. Y.....Oct. 17-19

A. S. M. E.

Cincinnati, Oct. 22-25—Machine Shop Practice.

S. A. E.

National

Chicago, Dec. 6-7—Aeronautic.
Detroit, Book-Cadillac, Nov. 22-23—Production.
Detroit, Book-Cadillac, Jan. 15-18—Annual.
Newark, Robert Treat Hotel, Oct. 17-19—Transportation.
New York, Hotel Astor, Jan 10—Annual Dinner.

RACES

Salem ....Oct. 12